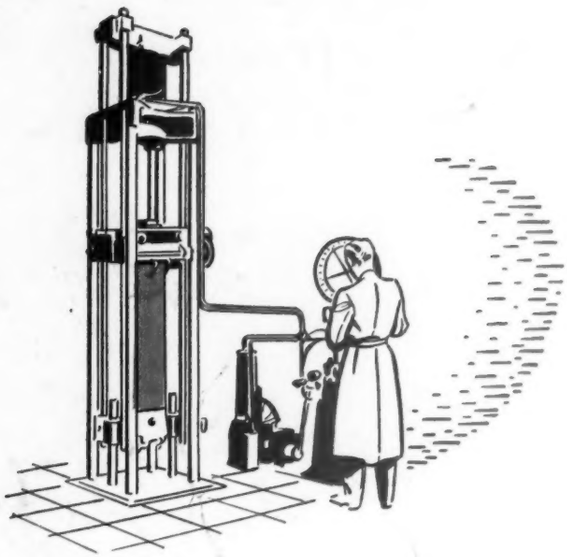
AVIATION

MORE WASPS FOR SCADTA —

This month marks the twenty-first year of successful service for Scadta, whose network of air lines has achieved remarkable time savings in transportation throughout the mountainous Republic of Colombia. Latest additions to its fleet, like all the other airplanes in Scadta's service, are powered by dependable Pratt & Whitney engines.

PRATT & WHITNEY AIRCRAFT

Divisions of ... NECTICUT



and why is this research, anyway?

If you should tomorrow be given the job of improving speed, or safety, or payload ratio of a 'plane, one of your first thoughts would inevitably be, "Why not use stronger, lighter materials?" Following this logic, you might inquire, "What materials are light and strong? How can we make them stronger and lighter?" Persevering, you would soon learn that what you want is largely an increase in the knowledge of materials, and you would find a

surprising company of men working to supply your want, so far as Aluminum is concerned.

Knowledge about a metal doesn't increase by happenstance. To develop it, metallurgists and engineers must experiment, test, record, and study, in the patience-trying, expensive process called research.

Scores of trained men in Aluminum Research Laboratories are this moment working on problems related to aircraft development. Some apply the fundamental techniques of metallurgy, seeking new alloys of Aluminum, or discovering new facts about known alloys. Some wrestle with production problems, to find better ways of handling the metal as it is transformed from ingot to the finished products which you use. Another group studies structural methods, to learn more about the kinds of columns and beams and rivets and welds best suited to Aluminum. Service in actual applications gets due attention; you see the results, for example, in the accepted uses of bare Alclad sheet. And special projects are undertaken in cooperation with other groups interested in aeronautics.

Benefits from this program are visible. On the desks of aircraft designers you will find the reliable data developed in this way. In plants where 'planes are built you may see workmen applying important techniques so fostered. Study the maintenance methods of any major airline, and you will discover how knowledge contributed by research has made Aluminum equipment serve long and safely.

This program of research for the alloys of Alcoa Aluminum was begun before Aluminum became a major aircraft material, has been maintained consistently through good times and bad. It holds the product to rigid standards. It provides trustworthy information. It adds to the natural lightness, strength, stability and other qualities, which make Aluminum serve more efficiently. And that is an answer to the "why" in the headline. ALUMINUM COMPANY OF AMERICA, 2182 Gulf Building, Pittsburgh, Pennsylvania.

ALCOA

ALUMINUM

ALCOA · ALUMINUM

THE
OLDEST AMERICAN
AERONAUTICAL MAGAZINE

AVIATION

Established 1916 . . . . . .
McGraw-Hill Publishing Company, Inc.

Louis F. Stoll
Vice-President

S. Paul Johnston
Editor

•

Leslie E. Neville
Managing Editor

Daniel Sayre
Associate Editor

Donald G. Fink
Radio Editor

Charles F. McReynolds
Pacific Coast

Paul Wooton
Chief of Washington Bureau

McGraw-Hill Publishing Company, Inc.
James H. McGraw
Founder and Honorary Chairman
Publication office, 99-129 North Broadway, Albany, N. Y. Editorial and executive offices, 330 West 42nd Street, New York, N. Y.

Chicago, 520 North Michigan Ave.
San Francisco, 883 Mission St.
Los Angeles, 9121 Dalton Ave.
Aldwych House, Aldwych, London, W. C. 2
Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta, Ga.

James H. McGraw, Jr. President	Howard Ehrlich Executive Vice-President
Mason Britton Vice-Chairman	B. R. Putnam Treasurer
D. C. McGraw Secretary	J. E. Blackburn, Jr. Circulation Manager

Published monthly, price 35c a copy. Subscription rates—United States, Canada, and Latin American republics, $3.00 a year. All other countries, $5.00 a year or 20 shillings. Entered as second-class matter, September 3, 1936, at the Post Office, Albany, N. Y., under the act of March 3, 1879. Printed in U. S. A. Cable address "McGrawhill, New York." Member of A.B.C. Copyright 1938 by McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York, N. Y. The following publications are combined with AVIATION: AERONAUTICAL ENGINEERING, AIRCRAFT JOURNAL and THE AVIATION NEWS. All rights to above names are reserved by the McGraw-Hill Publishing Company.

de Havilland "Frobisher" with four Gipsy 12 engines

Contents for Vol. 38, No. 1

JANUARY 1939
REGULAR EDITION

Flashes 13
From the Skyways of the World

Side Slips *By Robert R. Osborn* 17

Frontispiece 18
Travels of the Editor

"Dear Les" 19
Part two of the Editor's foreign travel report letter

Box Score *By S. Paul Johnston* 22
An Appraisal of European Air Armament

The Paris Show 26
An American View of the XVIth Salon de l'Aviation

Seaplanes on Land *By George B. Post* 28
How to land your seaplane on the airport and walk away.

Forces Acting on the Catapault 30
By Capt. Holden C. Richardson, U.S.N. Ret.
Second of two articles on "assisted take-off"

Flying Equipment 32
- Douglas DC-5 Goes High Wing 32
- Edwards Twin Engine Monoplane 32
- Rearwin Plans Side-by-Side Model 35
- The Case for Built-in Slots 36

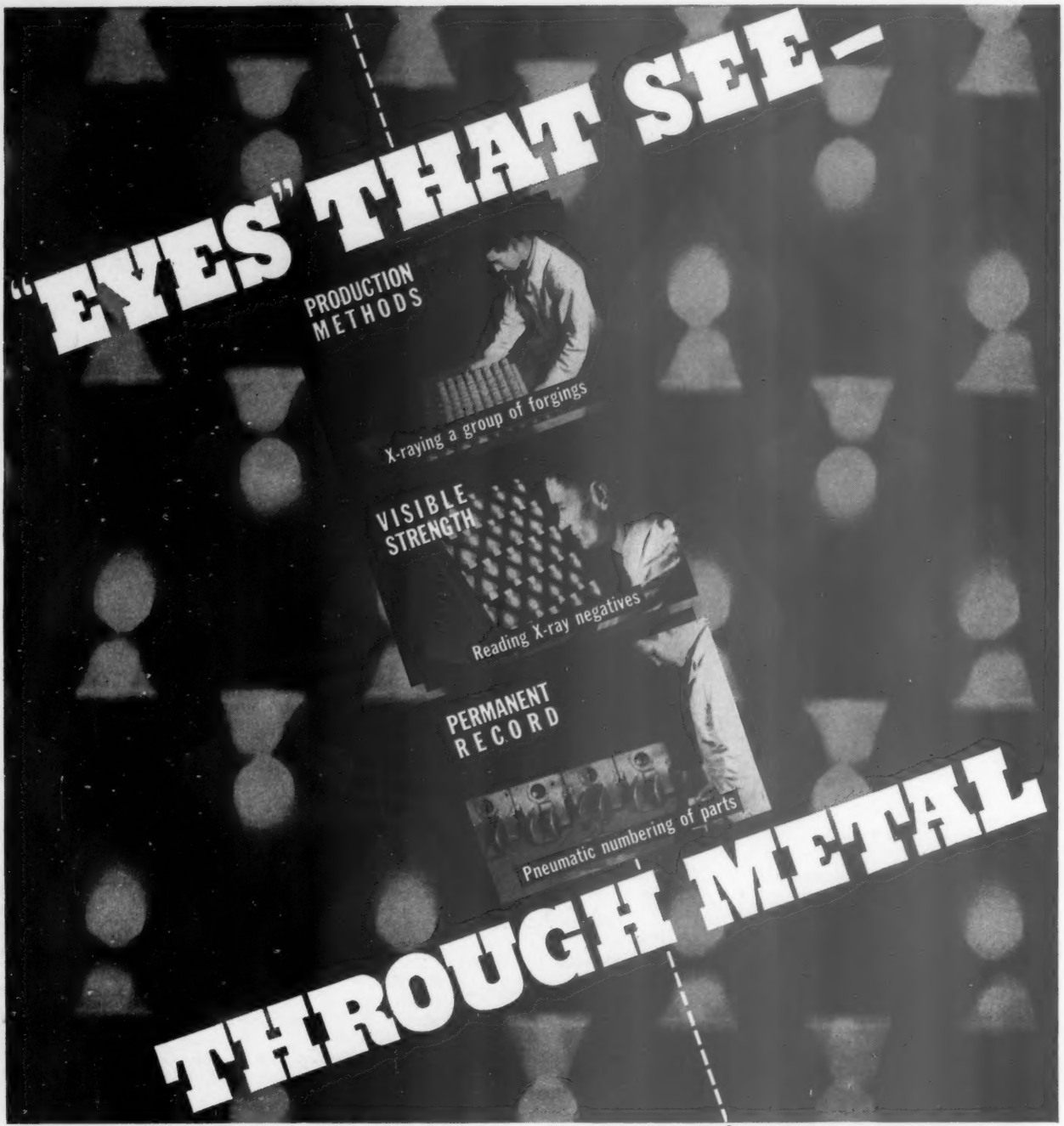
Aircraft Radio 38
Dialing the Airwaves with Don Fink

Buyers' Log Book 41
A Review of New Equipment for the Industry

The Aviation News 47
- Aviation in Washington 50
- Aviation People 52
- Profits and Losses 59
- Logging the Lines 61
- As Others Fly It 62
- Scouting the Squadrons 65

Operators Corner 67
Tagging the Bases with Les Neville

A McGRAW-HILL PUBLICATION



Lockheed subjects forgings, castings, welded units and other metal parts to X-ray inspection in addition to exhaustive tensile and compressive tests. ★ Primary stress parts, regardless of size, are 100 per cent X-rayed by the advanced Triplett & Barton method. Negatives are inspected by metallurgists trained in the interpretation of radiographs. ★ The infallible scrutiny of the eye that sees through metal gives complete assurance that only perfect parts are used in Lockheed airplanes.

...ONE OF THE RIGID TESTS THAT PROVE LOCKHEED QUALITY

LOCKHEED

LOCKHEED AIRCRAFT CORPORATION, BURBANK, CALIF., U. S. A.

Representatives Throughout the World

Flashes

From the Skyways of the World

In This Issue

After nearly two months overseas, your Editor is back with us again with several trunks full of information on what is going on in England, France, Germany, Italy, and The Netherlands. First installment is a report on military aircraft production abroad which should be of particular interest to government officials and manufacturers faced with the problem of building up our own military air services. We also offer the continuation of Mr. Johnston's daily letter, in which he gives a day-by-day report of his trip abroad. Winding up the European material for this issue is his reaction as an American to the Paris Show. . . . . In his appraisal of the relative air power of the major European nations Mr. Johnston takes into account not only the number of airplanes on hand and their quality, but production rate, productive capacity, personnel and morale of the air forces. . . . How to land your seaplane on land and get away with it is told by George B. Post, who has had plenty of experience with water operations. . . . Concluding his discussion of assisted take-off, Captain Holden C. Richardson's concluding article deals with the forces acting on the catapult car and the methods of accelerating the car. . . . First releaseable reports on the Douglas DC-5 reveal that it is a high wing monoplane with tricycle landing gear and 16-passenger capacity. Other flying equipment includes the Edwards twin engine light plane with two Continentals, Funk Monoplane with Ford engine, and preliminary details on the Rearwin 8000 side-by-side ship.

» WE USED TO have a pretty tough job answering inquiries from young fellows (and their parents) all over the country as to what sort of jobs there were to be had in this aviation business, and how to go about getting one. Now it's a cinch, for not long ago Dr. Carl Norcross of the New York State Educational Department wrote a book that has in it most of the answers. We are glad to say that "Getting a Job in Aviation" was published in our own house (McGraw-Hill Book Company, New York). The book paints no glowing picture of a future of unlimited opportunity. The author's intent was to make a sane and scientific study of the problem, and to present it as realistically as possible. He made an exhaustive study of the subject in the field. He travelled thousands of miles visiting airports, manufacturing plants, maintenance bases, and schools from Maine to California. He talked to hundreds of people who are intimately connected with every phase of the business. And having thus collected a tremendous mass of information on the subject, he digested it and presented it in a form that not only makes good reading but also good sense. If you know of anyone who is thinking about getting a job in aviation (and who does not?) we suggest the Norcross book as required reading. It costs $2.50, a small enough investment when a decision on a career for a lifetime may be involved.

» NO MORE FITTING MEMORIAL to man's conquest of the air could be established than the annual (Dec. 17) Wright Brothers' Lecture given under the auspices of the Institute of the Aeronautical Sciences. The date is the anniversary of the first flight at Kitty Hawk, N. C. The lecturer is always an eminent aeronautical scientist, on alternate years an American and a foreigner. The subject relates to some outstanding advance in the art.

First Wright Lecture was presented in 1937 by Prof. B. Melvill Jones of Cambridge University, England, on "Flight Experiments in the Boundary Layer." This year the tradition of scientific excellence established by Prof. Jones was ably seconded by Dr. Hugh L. Dryden of our own Bureau of Standards with a paper on "Turbulence and the Boundary Layer" based on extensive wind tunnel research over many years both in the Bureau and at Langley Field (NACA). The lecture will appear in full in an early issue of the Journal of the Institute of the Aeronautical Sciences. Great interest, and also great *éclat*, attached to the occasion by participation in the discussion of such men as Dr. George Lewis, Dr. W. F. Durand, Dr. Jerome C. Hunsaker, Dr. Boris A. Bakhmeteff, and Dr. Edward P. Warner.

A more detailed account of Dr. Dryden's remarks on boundary-layer problems appears in the news section of this issue.

Contacting the Continents

. . . in the field of Aviation

REPRESENTATIVES AND AGENTS FOR THE WORLD'S LEADING AMERICAN PRODUCTS AND EQUIPMENT.

CONSTANTLY ALERT AND AWARE OF THE LATEST DEVELOPMENTS AND IMPROVEMENTS IN AIRCRAFT.

A WELL EQUIPPED ORGANIZATION AND EXPERT STAFF COMPETENT TO MEET THE MOST EXACTING REQUIREMENTS AND NEEDS.

The
INTERCONTINENT CORPORATION

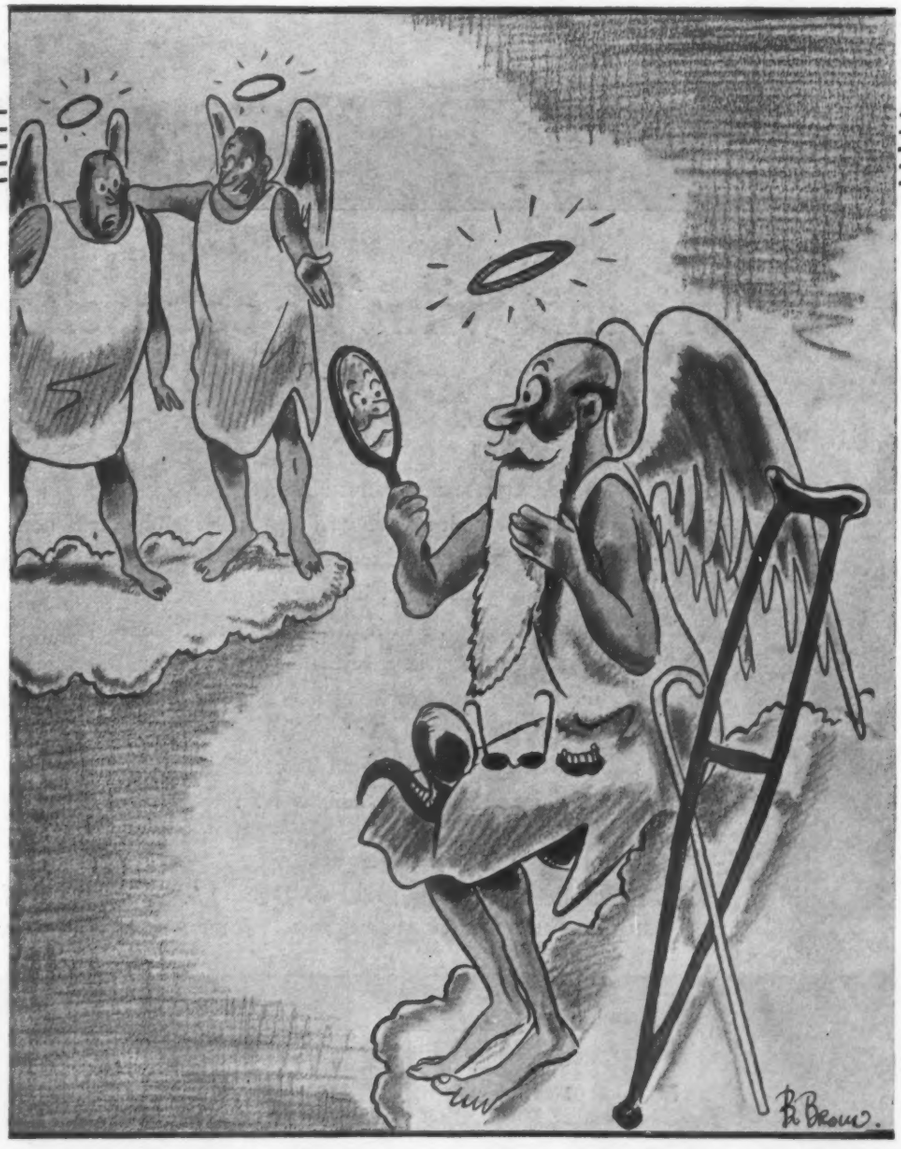
30 ROCKEFELLER PLAZA, NEW YORK CITY, U. S. A.
CABLE ADDRESS: INTERAERO, NEW YORK

•

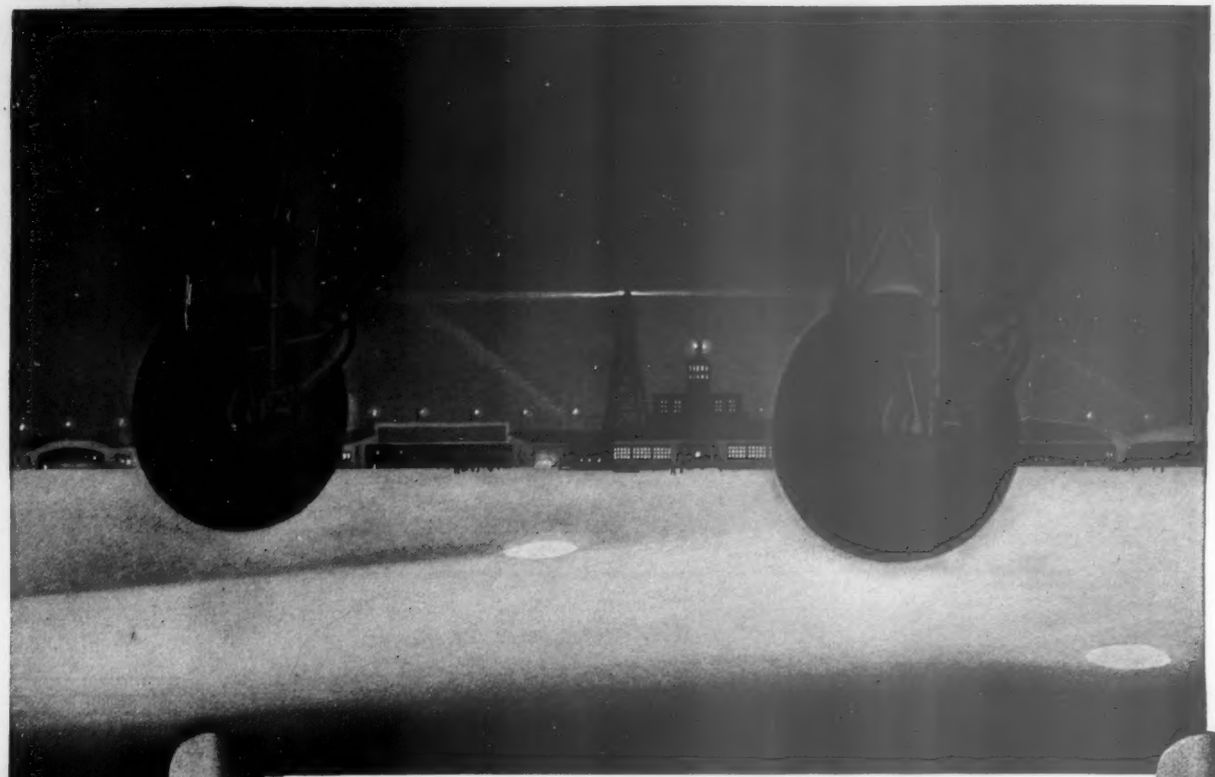
Sherman M. Fairchild presented Dr. Dryden with an honorarium of $250 (foreign lecturers get $500) made possible by the endowment of the Lecture by the Vernon Lynch Fund. After the Honors Night Dinner of 1937, Edmund C. Lynch (who was Mr. Fairchild's guest at the dinner) was so impressed by the brilliance of the occasion that he presented to the Institute a sum just over $10,000, the income from which is to cover the expense of the Lectures. The endowment is a memorial to his brother Vernon Lynch, who died in 1918.

Coincident with the final announcement of the 1938 Wright Brothers' Lecture came word from Lester Gardner of the postponement of the 1938 Honors Night Dinner until Jan. 27, 1939. Due to pressure of events abroad, Mr. A. H. R. Fedden, guest of honor to whom the Daniel Guggenheim Medal was to have been presented, cabled that it would be impossible for him to attend on the date originally set. The dinner will be held during the annual meeting of the Institute and has been scheduled for January 27, 1939.

» SPORTING FOLK OF THE SOUTHWEST are running successful coyote hunts, directed from an airplane flying overhead, which reminds us of one of Marshall Boggs' stories of his Army flying days. He was traveling along over the plains of Texas in a DH when he noticed, below, two coyotes pursuing a jack rabbit. The coyotes were running parallel and about a hundred yards apart, so that the rabbit would be cut off whichever way he turned. Boggs decided to help out the rabbit by making a series of dives to scare the coyotes. After several passes he became so absorbed in the chase that he finally got badly off the wind, and on one of the sharp pull-ups the ship fell off and spun in. As the two broken upper longerons effectively pinned Boggs in the cockpit, he had plenty of time to think up a good alibi for the accident report.



Maguire is going to apply for a certificate of convenience and necessity under the grandfather clause.



"He that wilna' be counselled canna' be helped"

SOUND wisdom once more, from the straight-thinking men of Scotland! And since it says so well what must be said, if Bendix' fund of helpful information and experience is to be useful to you, we commend its gentle philosophy. The design of aircraft landing gear is never a simple problem. But it is made far less complex when the ready collaboration of Bendix specialists is drawn upon, to reinforce and make more certain your own engineering judgement. Ideal application of Bendix Pneudraulic Shock Struts, for example, involves co-ordination of weight and impact factors which only *you and we together* are equipped to adjust happily . . . to the end we both desire: "happy landings!"

BENDIX PRODUCTS DIVISION
OF BENDIX AVIATION CORPORATION · SOUTH BEND, INDIANA

BENDIX

AIRPLANE WHEELS · BRAKES · PILOT SEATS · PNEUDRAULIC SHOCK STRUTS

Side Slips

By
ROBERT OSBORN

An Airplane Designer Begins a New Project

Having finished the morning paper the Designer leans back in his chair and starts to read over the customer's specification for the new airplane.

Thinks it would be a good idea to underscore with red pencil the parts of the customer's specification which will affect the design. After completing four pages finds that he has un-

derscored all but three words so throws down specification in disgust.

Goes into Drafting Room to discuss latest sporting news with favorite layout draftsman. Finds him busy on a rush job for another designer. Dashes into Chief Engineer's office and pounds on desk, demanding that favorite draftsman be transferred to his project and moved into his office to assist, as no other draftsman is able to understand what he wants done. Chief Engineer grunts and says that he'll think about it.

Wanders through drafting room looking at work being done for other designers and offering suggestions which involve scrapping all drawings and starting over again.

Designer is startled on returning to his office to find that favorite draftsman has already been moved in and is ready to go to work.

Suggests that centerlines be drawn here, here, and here, and returns to desk for contemplation.

Reads through specification hurriedly and then slams it down on desk asking howinell customer expects to get all that in one airplane.

Looks at drafting board and suggests that centerlines be moved to here, here and here to allow more room for expansion of sketches.

Lights cigarette and starts reading specification again with determination. Discovers that latest model of engine is called for. Swears blue streak but is secretly glad as draftsman will be kept busy a few hours making a scaled-down drawing of engine.

Gets new notebook and paper filler from stock room and letters name of new project and his name carefully on front cover, inking in letters with beautiful shading.

Places feet on desk and starts trying to concentrate on the details of the specification again.

Factory Superintendent calls up and says would like him to look at a fitting of his design which is giving trouble in shop. Designer says that he'll be down immediately to look at it. Shop Superintendent faints at other end of 'phone as he expected that Designer would manage to get down to see fitting in about three days, as usual.

Returns to offices and starts in on specification again. Notices grasshopper on window sill. Studies unique details of grasshopper and considers application of catapulting gear for Navy ships.

Goes over to golf club for lunch and discusses merits of new design of clubs with professional.

Returns to plant and as he passes watchman's gate-house hears important baseball game being broadcast on radio. Listens to several innings, discussing probable outcome of pennant race with watchman.

Back in office starts reading over specification again.

Admires lettering on cover of new notebook and then numbers pages therein, using ornamental figures.

Suddenly realizes that if he is to turn out design which is absolutely up to date it will be necessary for him to read up on latest developments here and abroad as noted in aeronautical magazines. Gets magazines and reads all social and political news therein. Makes mental note to read technical articles later.

Wanders down into shop to watch operation of new rivetting machine.

Talks over international political situation with foreman of the Sheet Metal Shop.

Hears report that new airplane built by competing company has landed at field so drives over to see if there are any new ideas thereon to be appropriated. Looks ship over carefully. Points out to foreman of Hangar Crew all details which were improperly designed and expresses amazement that competitor managed to get a large production order on such a poor airplane.

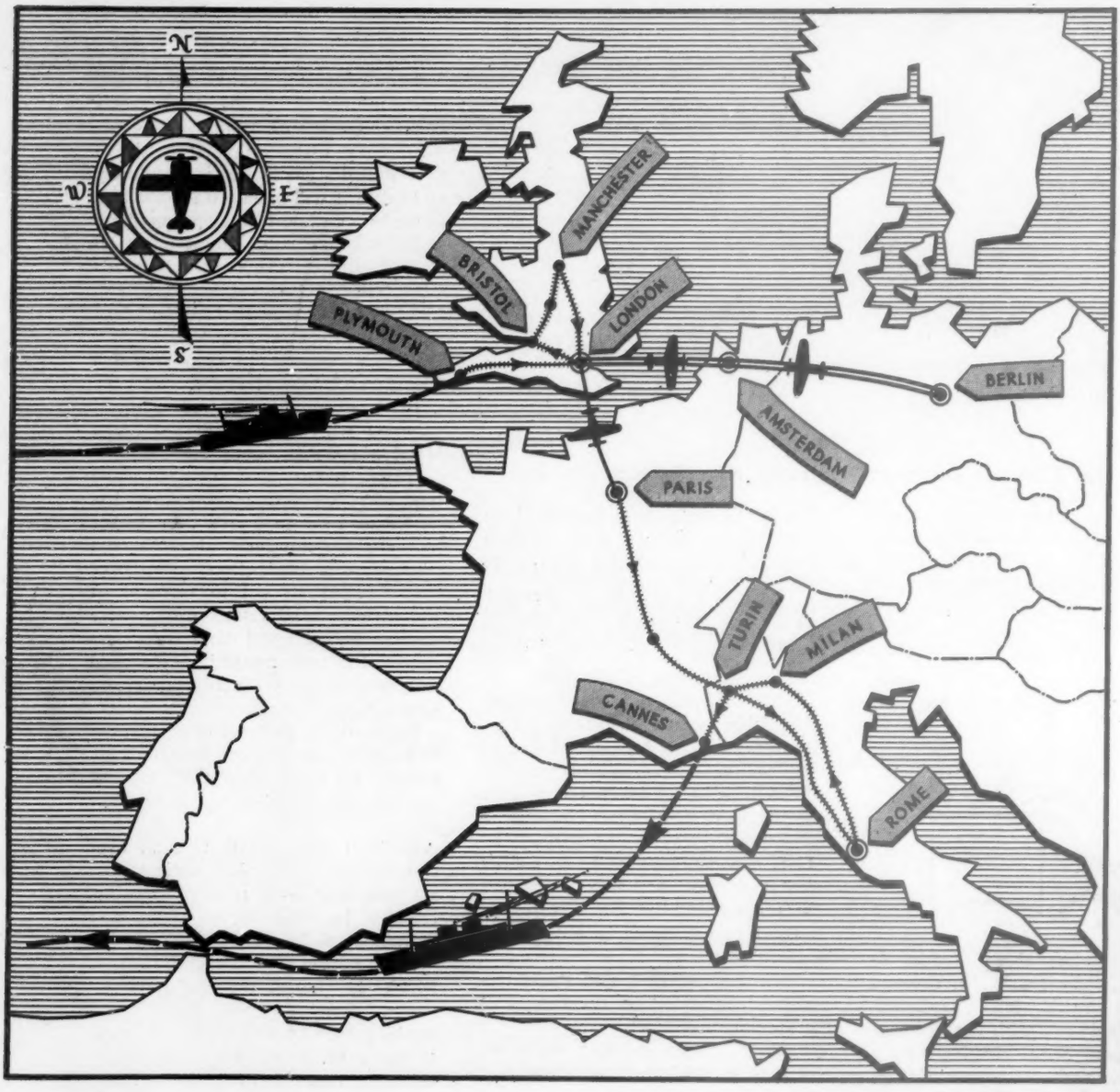
Walks down to the School Hangar to watch students practicing landings. Comes to conclusion that modern landing gears are pretty good after all.

Back at office starts to read over specification again but notices that his slide rule is in need of cleaning. Decides he had better clean rule thoroughly as he will be using it a lot.

Also notices that desk drawer in which he keeps cigarettes, rubber bands, chewing gum, paper clips, smoking tobacco and pipe cleaners is in need of fixing up. Takes considerable care in working out good arrangement of contents.

Sees that it is almost quitting time and if he doesn't hurry he will probably hold up the starting time of his golfing foursome. Puts on hat and

coat and wanders over for look at drafting board. Observes that favorite draftsman has made progress on preliminary sketches for new design



★ AVIATION *for January, 1939*

A REPORT ON AVIATION ABROAD AND A SCORE SHEET OF AIR POWER IN EUROPE.

Dear Les:—

Being a continuation of the editor's "as written" travel letter of which Part I appeared in the December issue.

Turin, Italy,
December 2, 1938

If there has been any one thing that has stood out in the events of the past few weeks of travel it has been the extremely cooperative attitude of everyone with whom I have had to deal. I couldn't say too much about the help given me by our embassies in London, Berlin, Paris, and Rome. Commander Keen Harrill, Lieut. Comdr. Paul Pihl, Jack Ide, and Lieut. Comdr. John Cassidy of those cities respectively each went long out of his way to secure the necessary official permissions to visit aviation centers. And the Air Ministeries of England, Germany, France and Italy were extremely cooperative in granting permissions, in arranging visiting schedules, and in furnishing guides and transportation.

Considering the unsettled state of affairs in Europe today, it was very gratifying to be able to see so much and to be so well received by the officials of the several countries I visited. For, actually, such things are not arranged overnight. These days it takes a great deal of advance preparation and careful handling on the part of the individual and the embassy involved. That is something that many visiting Americans don't understand.

What happens in European aviation has an important bearing on our own plans for defense. After Munich's conference we considered it essential to have a look at close range.

I left England on the early morning of November 12 on board a KLM DC-2 for Amsterdam. Arrangements for the trip had been made by Mr. Hartsinck of the New York office through KLM, London. It was only 1 hour, 40 minutes across to Schiphol where I disembarked and spent the day. The airport has been tremendously improved since I was there in 1936, enlarged and provided with excellent paved runways—one of the relatively few such installations in Europe. When I took off for Berlin the following night I had a chance to see something of the new lighting, which is very good. There is a Lorenz blind landing beam on tap, also.

I was met by Commander Thompson of Schiphol and by Messrs. Behage and Wannikhof of KLM, who took me to the offices of Mr. Spit, head of KLM's technical departments. Had a good discussion of maintenance problems generally, then spent the rest of the day in the shops. KLM has one of the finest overhaul plants in the world at Schiphol. Since all their equipment now (except a couple of old Fokkers for joy-hopping and charter work) is Douglas or Lockheed, the arrangements and the practices look very familiar to Americans.

Stopped in for a while at Fokker's

★ ★

1938 Paris Show

AVIATION Photo.

assembly plant on the aerodrome. Both the G-2 fighter (first shown at the 1936 Paris Show) and the new twin-engined heavy bomber are in production for the Dutch government. Test flights were being run on both types that day, and the performance of each in the air looks excellent. The G-2 seems very fast and highly maneuverable. I saw pilots throwing them about like small pursuit ships. Fokker's new tandem twin-engined fighter (which I saw two weeks later in Paris) is not yet in production.

In the Carleton at Amsterdam that night I ran into a Curtiss-Wright crowd, Bill Reeks and "Robbie" Robinson, on their way up to Norway, and Jack Guntlicht, one of the service men in Holland.

Sunday (November 13) I went over to The Hague and spent the day with our good friend, Henry Seyffardt and his family. Henry is, as you know, well up on aviation affairs in Europe. Saw him again later at the Paris Show. Back to Amsterdam in time to catch Lufthansa's 6:20 schedule which put me into Berlin at about 10 o'clock that night. Capt. Rudolph Jahn, who has represented Deutsche Lufthansa in New York for several years, had very kindly advised Berlin and Amsterdam of my coming, and all necessary arrangements were made for me.

I had hoped that either the new FW-200 (Focke-Wulf Condor) or the Ju-90 (Junkers) machines would be on the London - Amsterdam - Berlin service, but found that they are only on a few of the short, internal (Germany) runs for the winter. Old Faithful, the Ju-52, is still carrying the majority of DLH's traffic in Europe. Actually, it isn't a bad machine from a passenger standpoint—a bit noisy by modern standards, but not at all uncomfortable once one becomes accustomed to the way the wings flap up and down in rough air. And from a pilot's angle, it is probably one of the easiest handling machines in the world, and therefore probably one of the safest for blind and bad weather work.

Several days later I had opportunity to inspect both the FW-200 and the Ju-90 at Templehof. They are very interesting machines, and quite up to the best modern transport practice all around.

Incidentally, DLH is starting its first hostess service on the FW-200s. Several girls are in training and will form the nucleus of an extensive system. KLM's hostess system was new when I was here two years ago, but has been continued, and is flourishing.

Research work at Guidonia compares in quality with that of any aeronautical laboratory in the world. Here a view of the towing basin with one of the two towing carriages in the foreground.

Inside KLM's magnificent overhaul station at Schiphol. Except for markings on planes, a visitor might think he were in any one of half-a-dozen of the outstanding maintenance shops in the United States.

The new Templehof is a part of a great construction program for the improvement of the city of Berlin. The buildings shown in the model above are partially completed. The curved canopy under which the largest airplanes can be run for loading, storage, or servicing, is over 4,000 ft. from end to end. Dotted lines on map on opposite page indicate boundaries of present Templehof field.

Monday (November 14) was spent largely in our Embassy and in the Air Ministry, arranging a program for the week. Unfortunately, Dr. Baeumker of the Lilenthal Gesellschaft (who had forwarded to me in London a very cordial invitation to visit the German aircraft industry) had had some difficulty with his eyes following the strain of the September meetings, and had gone to Sicily for a rest. Dr. Klebs of the Foreign Attaché group, and Dr. Schwenke, one of Dr. Baeumker's assistants, were most helpful, however, in making plans. Had luncheon that day in Berlin's beautiful aviation club, Haus der Flieger, with Dr. Otto Merkel (well known to many of us in the States) and also met Mr. Walter Lutz and Mr. H. M. Bongers of Lufthansa and a number of other people prominent in German aviation.

The following day was really the highpoint of the visit in Germany, for it was spent in th new Heinkel plant at Oranienburg. I shall want to go into detail later about this plant, for it would provide material for many articles in itself. Suffice to say, it is probably the finest and best equipped of any aircraft factory in the world today. It was built from scratch about a year and a half ago to really *produce* airplanes—and it certainly can, and does. It is now entirely on Heinkel 111 bombers with Jumo 211 direct injection engines.

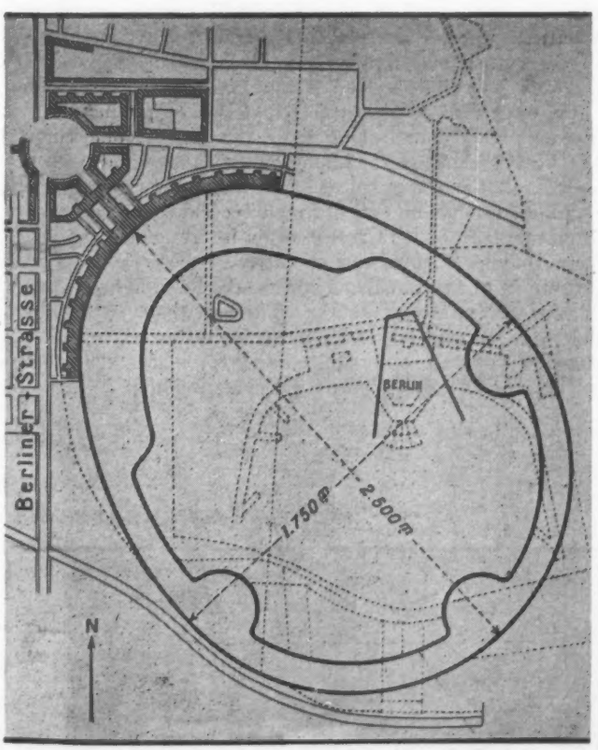
I was accompanied on the Oranienburg trip (in an Air Ministry car) by Dr. Sommers of the Ministry. At the plant we were received by Mr. O. M. von Pannowitz and several assistants and given every opportunity to inspect all the facilities, including the cooperative villages and farms which have been built for the workers, and the Luftschutz (Air Raid Precautions) arrangements, which are far and away the most complete and elaborate that I have seen anywhere.

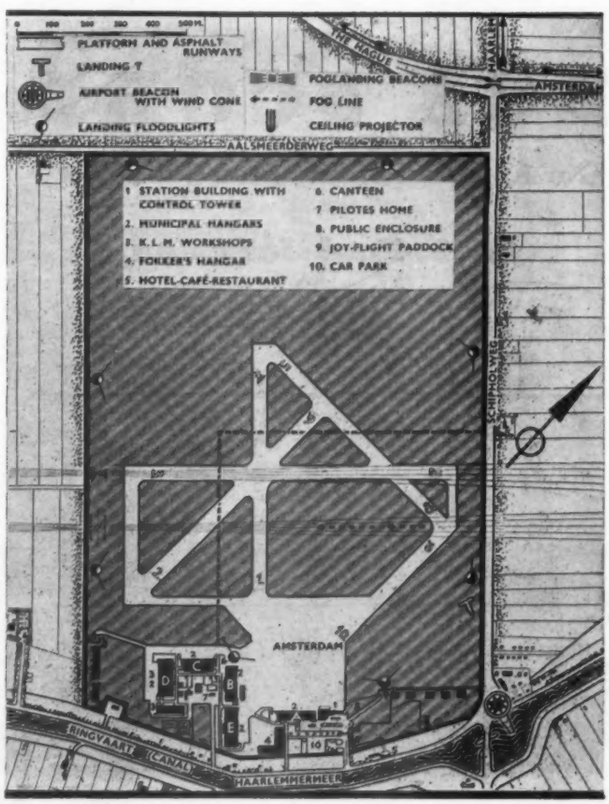
Since Wednesday was a holiday and factory visits were impossible I spent a part of it inspecting the new Templehof with Mr. Lüdwig of Lufthansa. There again is another long story in itself. We have all seen photographs and models of the new field and its buildings, but they don't even begin to prepare you for the thing "in the flesh." It simply takes your breath away in its concept and execution. It seemed to me that you could put the whole of New York's Grand Central Station inside the main passenger waiting room at Templehof and still have room to do considerable rattling about. And the field itself is just about three times the size of the present area used for landings. Actually, the place is far from complete. It will take about one more year to finish the job. Construction is at least six months behind schedule because the men who worked on it were pulled off last spring to go to work on the western fortifications—the so-called Siegfried Line. They are only now beginning to filter back to their normal occupations.

On Thursday I revisited the Henschel plant at Schönefeldt. When I was there in 1936 the plant was on Ju-86s with Jumo 205 diesels. It is now turning out Dornier DO-17s under license. I had received permission to go down to Friederichshaven to see the Dornier plant, but found that there was no connecting air service in the winter time, and the trip by rail was too long to be fitted into the short time available. Had to be content, therefore, to see Do17s coming out at Henschel's. As at Oranienburg, the plant was under no pressure for production. It was full of machines, but operating only on one 8-hour shift. I went out with Dr. Tilenius of the Air Ministry and was entertained by Mr. von Winterfeldt (whom I had met in '36) and by one of his assistants, Mr. Roelikce.

Friday was a busy day in and about Berlin. First went to pay my respects to Direcktor von Gablenz of Lufthansa in his new office high up in the

(*Turn to page 73*)





Right: The new layout at Schiphol. Project is now complete and represents one of the finest airport layouts in Europe.

Germany's DO-17 Bombers

Every returning observer of Europe's kaleidoscopic aviation scene has his own ideas of relative air strength. This table and the supporting article represent the author's estimate of the state of affairs as he saw it in November and December, 1938.

BOX SCORE

An Appraisal of European Air Power

By S. Paul Johnston

Editor of Aviation

	Germany	Soviet Union *	Italy	Great Britain	France	United States
Airplanes (incl. reserves)	10	10	5	3	2	3
Quality	10	5	8	8	4	10
Production rate...	10	7	4	4	1	2
Production cap.†.	10	8	6	6	3	4
Personnel	10	10	6	3	3	2
Morale	10	6	9	6	2	6
Total points....	60	46	38	30	15	27
Rating	10	7.6	6.3	5	2.5	4.5

** Based on available information, not on personal observation.*
† Within bounds of present aeronautical industry in each case.

IN 1936, after an extensive survey of the aviation situation in Europe, I came back to the United States tremendously impressed by what I had seen, as readers of "Europe Re-Arms in the Air" (AVIATION, Jan. 1937, p. 28) will recall. Today, having just returned from a similar survey which covered all of the same ground and included some new territory, I am still more impressed.

Not that progress in military aircraft building has yet come up to levels predicted in the 1937 article. Obviously, I was a bit over-sold on the productive capacities of several countries, notably England and France. British production is only now beginning to reach the level that I had thought possible by the end of 1937, and the French position has grown increasingly worse during this period of transition from private to governmental control of her producing plants.

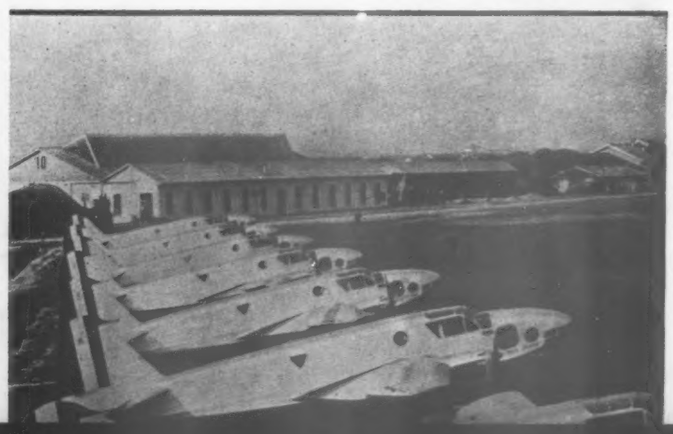
Germany has had, I believe, the productive capacity available to meet the figures predicted for her for 1937 and 1938. It would have been foolish, however, for a country in her economically strained position to plunge blindly ahead on an unrestricted building program. By keeping well posted on the trend of events in British, French and Russian aviation, Germany has obviously been regulating her output to maintain a comfortable lead over the neighboring nations.

Accurate figures are, of course, lacking, but conservative estimates of the production of military aircraft in France and England as compared with Germany and Italy for the latter part of 1938, may be lined up as follows: Germany between 400 and 500 per month; Italy, about 200 per month; England, close to 200 per month; France, about 75 per month.

There can be little doubt but that Germany today holds the balance of air power in Europe. Russia's position is, of course, a complete enigma. Two years ago I estimated that the U. S. S. R. was the No. 1 air power of the world, but it now seems very likely that it has been considerably over-rated in effectiveness, if not in numbers. It seems probable at present that Germany and Italy together might outweigh by a substantial margin the combined air power of England, France and Russia.

Air power is not measurable in terms of production or of machines on hand. One must take into account many complicated elements including aircraft on hand and in reserve, pilot and mechanical personnel, quality of men and machines, production rates, productive capacity, and overall morale both of the organized air forces and of the producing industry behind them. Many of these elements are not subject to exact analysis nor are the basic figures available for accurate computation. The best that can be done under the circumstances is to make estimates based on whatever facts are observable. Such estimates, therefore, can be only an expression of individual opinion. On that

Italy's Caproni Light Bombers



basis, then, is offered an accompanying score-sheet for the major European powers (in index numbers on an overall scale of ten).

Consider the current production situation in the several European countries.

Certainly, Germany seems already to be past the "pressure" stage for production, both of planes and of pilots. Her vast manufacturing and training programs are now rolling along smoothly, out-producing the rest of the world with little effort. In the factories I saw this year, one 8-hr. shift per day seems to be the normal working period. Holidays seem to be observed by complete shutdowns. For example, November 16 was *Buss und Bet Tag*, an ancient religious holiday, and I found that I could get no permissions to visit factories that day because they were all closed. This offered quite a contrast to conditions in England as I saw them, where many factories were operating full out on a three shift per 24-hr. basis.

Germany now has a group of the largest and best equipped aircraft manufacturing plants in the world. Estimates of the total personnel engaged in aircraft and engine manufacture range from 150,000 to 200,000; this, to stack up with the 36-40,000 people engaged in similar pursuits in the United States. In 1936 I had visited the extensive Heinkel design and manufacturing plant in the north of Germany at Rostock, the huge Junkers airplane and engine works at Dessau, and the then newest production factory, the Henschel plant at Schönefeld, near Berlin. This year I received permission to visit (among others) both the new Heinkel plant at Oranienburg and the main Dornier works at Friedrichshaven. Circumstances made it impossible to reach the latter, however, in the time available, so I revisited Henschel where the Dornier DO-17 bombers are in production under license.

To describe the new Heinkel plant at Oranienburg would take more space than is available here. It is a whole story in itself. Suffice to say that it is very likely the best equipped and the most efficiently operated aircraft producing plant in the world. Its various departments are housed separately in brick, steel and glass buildings, each well camouflaged, each provided with elaborate Luft-schutz (air raid) shelters and equipment. The several manufacturing units are scattered over a large area of ground to minimize bomb damage. The entire plant was built in less than a year and went into production about May, 1938. When I saw it late in November, it was turning out nothing but Heinkel 111 bombers, fitted with two Junkers Jumo 211 fuel-injection type 12-cylinder, inverted-Vee, liquid-cooled engines. At a guess, on one 8-hr. shift per day, and operating without pressure, it was probably turning out 10 to 12 machines per week. By turning on the heat it is not unreasonable that Oranienburg might be able to turn out close to 40 per week.

And although Oranienburg is probably one of the largest and best factories in Germany, it is only one of a group of large producing plants, among them Messerschmitt, Dornier, Focke-Wulf, Junkers, Henschel, Arado, etc., not to mention the numerous other secondary plants scattered about the country in active production on the designs of the major manufacturers. Estimates indicate that Germany turned out between 4 and 5 thousand machines in the calendar year 1937, close to 6,000 in the calendar year 1938, and, by the beginning of 1940, should be producing at an annual rate of some 8,000 units of all types.

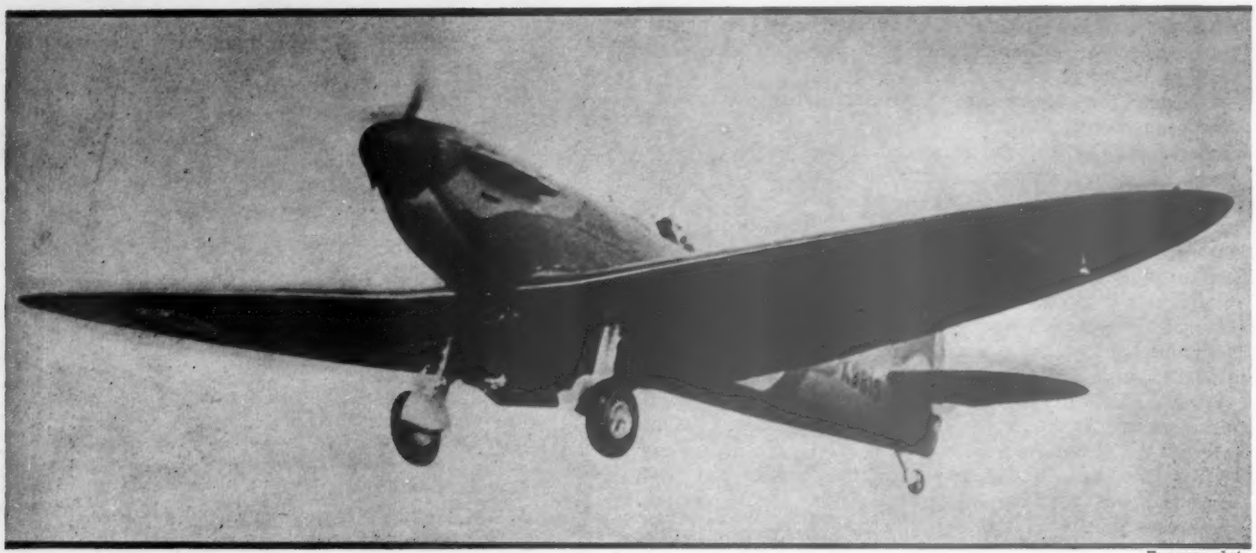
Conditions in England are quite different. After almost three years of intensive effort and expenditure of vast sums of money on the development of an aircraft industry and its shadow, the British are only now on the verge of something like quantity production of aircraft. Judging

Britain's Bristol Blenheims

from what I had seen in 1936, I had expected the British position to be much better than I found it in the Fall of 1938. True, large quantity orders were on the books. Rumor held that some 800 Hawker Hurricanes and 1,400 Spitfires (Vickers) were on order, and during the parliamentary debate following the September crisis, Sir Kingsley Wood announced that the standing orders for fighting ships of this type had been materially increased. Remembering that both the Spitfire and the Hurricane had been designed in 1935 and were flown in prototype early in 1936, the fact that very few Hurricanes (probably under 200 altogether) and (up to the end of November at least) practically no Spitfires had been delivered to squadrons is indicative of the general state of affairs in England today.

Probably the highest output of a service type machine is in the Bristol Blenheim of which between 1,000 and 1,500 are said to be on order. Blenheims appeared to be in active production in the Bristol factory in November 1936, but few of them are supposed to have reached service squadrons until mid-summer, 1937. Estimates indicate

French Amiot Bombers *International*



European photo

Fastest British Pursuit—The Spitfire

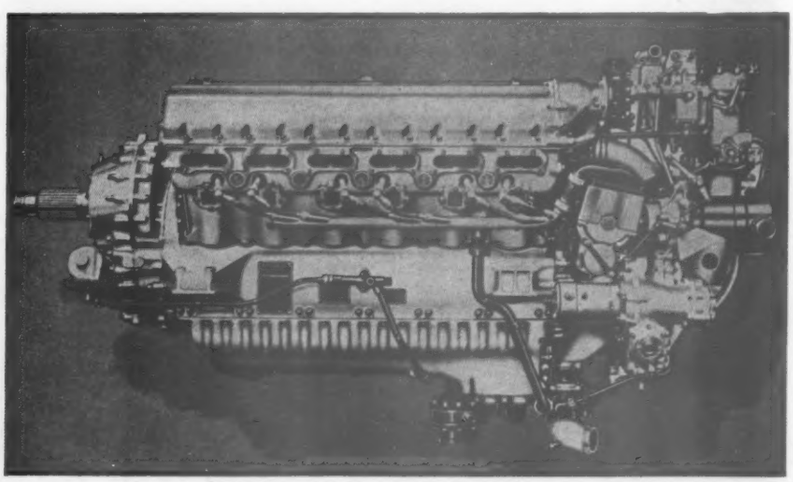
that fewer than 400 of them have actually been delivered. The big Bristol works at Filton are now turning them out at a rate that must be close to 10 a week, and the new Roots "Shadow" plant at Speake is reported to be just on the verge of real production. No accurate estimates are available of its capacity, but it is said to have a potential output of better than double the capacity of the parent Bristol plant.

Next most important machine in the current British production picture is the Fairey Battle. The basic design for this machine dates from early 1936 and it was actually in production at the Stockport plant in the late Fall of 1936. Stockport is still on production of Battles. Although definite figures are lacking, I would guess that they are coming out of the plant at the rate of close to two per working day.

But the center of gravity of Battle production is shortly to shift to the huge new Austin "shadow" factory at Longbridge near Birmingham. Completed less than a year ago, the Austin factory is one of the largest and finest airplane producing plants in Great Britain and stacks up with anything else of its kind in the world. It was designed from scratch for mass production of military airplanes. It was laid out and tooled up on the basis of the prior Stockport experience. Up to mid-November of this year actual production has been disappointing. But the troubles which might have been expected in the starting of such a large project are now being ironed out and I would guess that by mid-year Fairey Battles should be rolling out of the back door of the Austin plant at the rate of 15 or 20 per week.

Handly-Page, of course, has always been one of Britain's big producers. In the early part of 1937, H. P. produced a heavy bomber for the Air Force, the Harrow, of which 100 were built in a period of about nine months. Under development at that same time was a very fast bomber of somewhat unusual design, the Hampden. In fact, I saw the prototype and the early production models in November 1936. At the present time a smoothed-up version is in very active production at the Cricklewood plant. Obviously a great deal of attention has been paid to production methods and they seem to be rolling smoothly through the plant (at a guess) at a rate of about one machine per day.

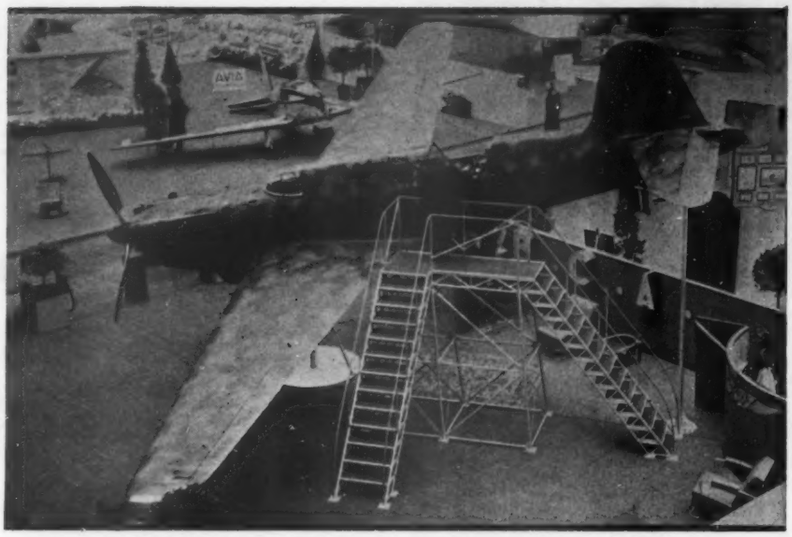
Geodetic construction was vindicated in the eyes of its protagonists by the very good show put up by the three Wellesleys on the flight to Australia in November. The Wellesley is not, however, still in active production, as the Vickers plant at Weybridge has shifted over to the larger twin-engined Wellington bomber. No place here to discuss the relative merits of geodetic vs. monocoque (or other) forms of construction, but I was impressed by the degree to which the complicated-looking geodetic structures had been simplified for production. With a relatively small investment in cleverly designed forming rolls and quite simple jigs, even in the hands of relatively unskilled labor it seems quite possible to produce reasonable quantities of geodetic ma-



New addition to Rolls Royce list, the 1296 cu.in. Peregrine

chines at not too great a cost. The production facilities at Weybridge are not as extensive as those of some of the other larger British plants, but it seems very likely that by the year's end three or four Wellingtons per week were being turned over to air force squadrons.

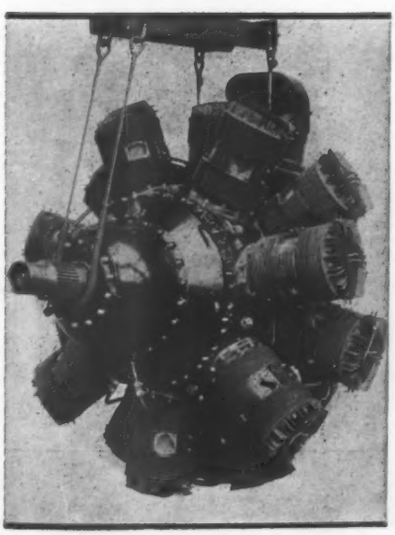
Very "hush-hush" are rumors of the development of a series of large four-engine bombers by Handly-Page and by Fairey. These machines would probably be in the same category as our YB-17 "flying fortresses," probably powered with Rolls-Royce engines. Completely unconfirmable rumors had it that some 350 machines of such a type were on order. For whatever it may be worth as an indication, however, Fairey had on display at the Paris Show (and on test in the new wind tunnel at Hayes), a model of a large four-engine machine very similar in outline to our Douglas DC-4, and allegedly a transport type. It is a fairly safe bet, however, that under present conditions, such a product would have been brought into the world first as a military type from which a transport modification had been derived later. We will watch for future announcements with considerable interest.



A Belgian fighter with a strong Italian flavor, the SBCA

International

Production of G-2 Fighters in Fokker's factory



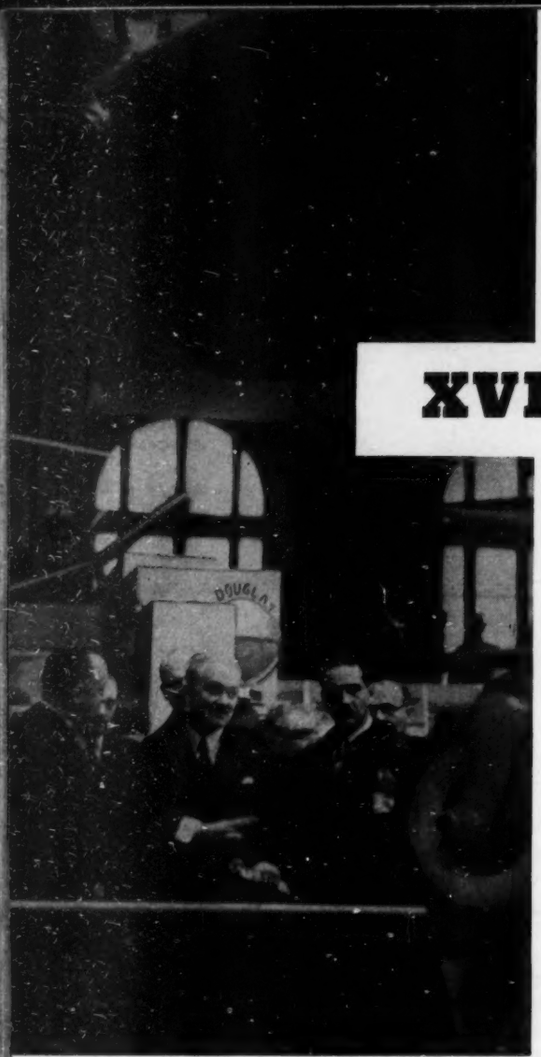
A Bristol Sleeve-valve engine

There is quite a scattering of other types of machine in active production for the R.A.F. at other plants throughout England at the present time. These would include the Avro Ansons, the Airspeed Oxfords and Envoys, the Armstrong Whitworth bombers and transports, the Boulton and Pauls, the Blackburns, the Gloucesters, the Westlands, etc., and such types for the fleet air arm as the Blackburn and the Short boats, the Fairey Swordfish, etc. Adding up what scattered information is available on these types, it seems likely that the R.A.F. is getting deliveries at between 10 and 15 per week for the lot.

Adding everything together and making due allowances, it is not unlikely that the total production of British military aircraft toward the latter part of 1938, was approaching 65 to 70 units per week, or a rate of somewhere between 3,000 and 3,500 machines per year. Actually, the production for the calendar year 1938 did not reach any such level, but probably totaled somewhere in the neighborhood of 1,800 units. The situation is now on the point of changing very rapidly for the better, however, as the big "shadow" factories are just on the verge of going into real production. It is reasonable to expect that the rate of production in England will continue to increase from the estimated rate of 3,500 planes per year as of the beginning of 1939 to a rate approaching 5,000 planes per year by January 1, 1940.

The engine situation in Great Britain seems to be in better shape than the airplane picture. As might have been expected, the "shadow" scheme of production seems to have worked better in engine manufacture than in airplane manufacture. For the most part, British military airplanes are powered with Bristol air cooled radials (Pegasus, Mercury, Perseus, or Hercules, the latter two being sleeve-valve types) and the vee type, liquid-cooled Rolls-Royce. In 1936 I had seen the original Bristol engine plant at Filton and this time saw not only the original plant again but also the

(Turn to page 80)



The President of France opens the Show

An American Looks at the

XVI SALON de l'AVIATION

Random pick-ups from the editor's notebook on the Paris Show of 1938

FROM A LAYMAN'S POINT OF VIEW the XVIth Salon de l'Aviation was a brilliant success, but for the technician, looking for new revelations in aerodynamics or structural design, it was disappointing. Actually there should have been little reason to expect otherwise, for it was scarcely reasonable, in the face of the events of the preceding two months, that the governments of Europe would send to Paris anything revealing in the way of their latest aerial weapons.

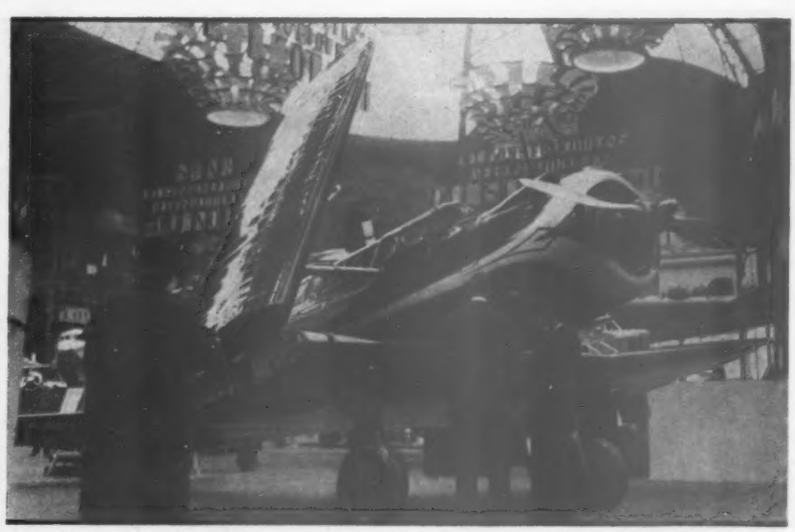
Except, possibly, for France. On her home grounds, and possibly trying to prove to the world that her position in aviation was not nearly as bad as most of us believe it to be, the Air Ministry threw into the Show a large collection of new machines—so new in fact that several of them seemed practically constructed on the spot. Most of them were obviously prototypes ranging through the whole list, from the big four-engined Bloch 162 bomber, to the single-engine single-seat fighter, Arsenal 30. The latter was probably the most interesting machine of the lot, but was hung up so high in the roof of the building as to be completely out of range of examination.

Other striking French machines included the Potez twin-engined bomber (whose prototype appeared in the 1936 show); a large twin-engined bomber of very clean lines, the Leo 45; Hanriot's new 232 twin-engined fighter (prototype seen in 1936); the Loire 130 single-seater; and the four-engined Potez 662 transport. Farman had a huge machine on view, a four-engined, (twin tandem) transport or bomber, notable only for its size, long since outmoded from a design standpoint.

If it was the French intention to impress the world, the arrangement of the French exhibit defeated its purpose to a certain extent, for the central section of the Grand Palais had been so completely filled with machines that it was difficult to get anything but an impression of a vast confusion of wings and wheels and propellers. By omitting some of the older models, which tended to make the whole exhibit somewhat out of date anyway, the really new stuff might have looked more impressive.

There was plenty of space around exhibits of other nations, however, for most of them (except for the Poles) sent only one machine of not too recent vintage, plus some models to illustrate more current production.

The German display was typical. In the center, suspended at a level which made detailed examination difficult, was a production model of the Dornier DO 17 bomber. Surrounding it, and, on the whole, well displayed, were large-scale models of such machines as the Junkers Ju 90, the Henschel 124 observation, the



One of the three American aircraft on display.—the Chance Vought (United).

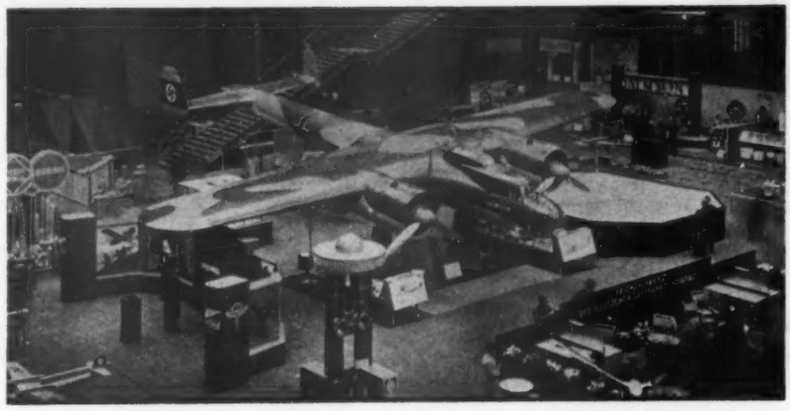
Focke-Achgelis heliocopter, etc. But not a sign of the Heinkel 111, the Messerschmidt fighter, or any of the newer equipment known to be in production. In their engine exhibit also a few of the standard older models, the big Mercedes-Benz diesel for airships of 900 to 1,200 hp., Hirth and Argus engines in the medium hp. range (400 and 500) and a couple of the newer inverted liquid-cooled motors, the Mercedes-Benz 950 hp. and the Junkers Jumo 211 of 1,200 hp. Significant, however, was the fact that both the Benz and Junkers engines were fitted with carburetors, whereas all the current production models seen going into aircraft in Germany were of the direct injection types. In other words, with little exception, there was nothing in the German exhibit that could not have been shown in the Salon of 1936 had Germany chosen to take part then.

And the same is true of the exhibits of the other major powers (Italy and Soviet Russia were completely missing). England, for example, displayed the same Rolls Royce Merlins (with some mechanical modifications, including a two-stage supercharger on one model, and with somewhat higher ratings) that were on display in 1936. Bristol Mercury and Pegasus, and the sleeve valve Perseus and Hercules were shown again. The Blenheim bomber was basically the same machine of two years ago except with a revised nose shape which had boosted the speed from the original 279 to about 295 m.p.h. And England could have displayed both the Spitfire and the Hurricane in 1936 in substantially the same form as they appeared this year in the Air Ministry's exhibit.

Two Dutchmen had been the great radicals in the 1936 show, Koolhoven with his tricky engine-aft-twin-props-forward monoplane fighter (shortly thereafter abandoned); and Fokker, with the unconventional G-2 multi-gun fighter (which survived flight tests following the 1936 show, and is now in active production for the Dutch government in substantially its original form). By 1938 Koolhoven had gone back to more conservative channels with a conventional type single engine single-seater fighter, the FK 58; but the irrepressible Tony had gone off in a new direction with

(*Turn to page 83*)

Civil offerings were few,—among them this pair of slick Caudrons.



Germany's stand,—a DO-17 surrounded by models, parts, materials

Background,—Hurricane; center,—Blenheim; right foreground,—Koolhoven

Right: The pilot of Fokker's new fighter is surrounded with engines and armor-plate. Note North American's display in background.

Aeronca Distributor George Edwards was able to walk away with the greatest of ease after landing his seaplane on Flushing Airport.

SEAPLANES ON LAND

By George B. Post

Vice-President, Edo Aircraft Corporation

PLENTY of old time seaplane pilots will swap stories dating back to war days and before, about how so-and-so put his HS boat down on a corn field or his N9 seaplane on the beach. For that matter the Wright Brothers always landed on skids—which might just as well have been pontoons—until they indulged in the luxury of adding a pair of wheels! Although old as an idea, it was not until very recently that any reliable first hand experience became available on exactly what it was like and how best it should be accomplished when the need arose. And I might add that until Mike Murphy put on his show at the Cleveland races, it is doubtful if there was one average pilot out of a hundred who *really believed he could safely get away with it himself in an emergency!*

It has become more and more evident for sometime past that more should be known about it. Consider, for instance, the fellow taking off from a small pond who loses his motor at 300 ft. If he *knew* he could land straight ahead in a field without hurting himself or his ship, he would never make that desperate attempt to get back to the water. And plenty of serious crashes have occurred from that set up. Furthermore, if he knew still more about it he might be able to swerve a bit, right or left, and pick the most suitable ground for the keels of his floats. Another example is the fellow who chooses the water instead of a field in the event of a forced landing along the shore of a lake, which a sudden storm has whipped into nasty surf. There are plenty of similar cases.

The subject first assumed serious proportions about a year ago when the new Civil Air Regulations were originally published. Among other things the early printings contained several paragraphs which said almost in so many words that seaplanes couldn't land safely on land. Naturally, with a long standing seaplane background of at least first class gossip exactly to the contrary, it was disconcerting to read it. Before going further, however, it should be added that the briefest kind of a survey brought out sufficient evidence to permit a fair minded board to immediately revise

One day Mike Murphy was sitting in his Cub seaplane after landing on the airport. He gave her the gun and, much to his surprise, took off.

those particular regulations! But it started a more thorough study, as referred to briefly below, which should prove of interest to all those who fly on the water.

STEP number one in the study was to send out a questionnaire to a selected list of well known and experienced seaplane operators all over the world, asking for first hand experience and details of land landings with seaplanes. Here are a few experiences.

From Ottawa, the Director of Canada's Civil Air Operations described a forced landing in a hay field. Pilot H. P. Ayres of Bellanca Seaplane CF-AEC reported, that the landing was occasioned by total engine failure due to a broken push rod, and was accomplished by landing slightly faster than normal with the tail a trifle high. The plane skidded along from the point where the keels first touched the ground for about 50 yards and then stopped with the keels about 7 in. below the field level. The plane was light, that is, there was no load whatever in the cabin and yet the tendency to nose over was very slight. The floats did not suffer the slightest injury from this landing and everything else appeared to be normal!

A closer neighbor, George Edwards, landed deliberately on a runway at the Flushing Airport in an Aeronca C-3. He picked an area of the airport with a trifle more care than he would have used when landing with wheels and leveled off in a conventional manner, though a trifle lower. Then keeping the pontoons parallel to the ground, not three point, he allowed the ship to settle flat on the keels of the floats to the ground. The landing was smooth on contact, and there was no more noticeable deceleration of the ship as the full weight of the ship was transferred from the wings to the floats, than would be noticed taxiing up a dry seaplane ramp. Upon measuring the keel marks on the ground after landing, the distance measured 45 feet. And the floats showed no damage whatever, except in a few places where the paint scratched off. There was no tendency of the ship to rock on end or to tip, as one might expect. Probably because the floats are far out in front of the c.g.

From Pacific Alaska Airways, in Fairbanks, Alaska, came the following comment, "Referring to your circular letter dated March 15, concerning landings on the ground with Edo floats, we can offer the following incident.

On October 2, 1934 a Fairchild 71, NC-142-H completed a delayed ferry trip from Seattle, Washington to Fairbanks, Alaska, on pontoons. The river here was running ice so that it was impossible to land and the plane was landed on the lake nearby, which was still open. All excessive weight was removed and the plane was then flown from the lake to the Fairbanks Airport where it was landed on floats on the bare ground with no damage whatever, and without even denting the floats. The ground was frozen hard and was reasonably smooth but without any snow at all. The pilot was S. E. Robbins."

In Norway Wideroe's Flyveselskap has carried out successful landings on ice with Taylor Cub and Waco F planes on floats. The landings were effected without undue strain on the gear, and starts on ice with even heavier types of planes have successfully been made.

W. E. Dunkle of Anchorage, Alaska, does a lot of float flying and considers it the safest type of flying with the possible exception of skiis. He has flown many hundreds of hours on floats and never worries about a forced landing. He had one crack-up on floats due to water in the gas cutting the motor out at 100 feet elevation just after clearing the shore of a small lake. Unfortunately, the lake was surrounded by small spruce timber —up to thirty feet high—and these knocked the plane down before he could place the floats on the ground proper. This ruined the wings and washed out the floats completely but it took the force of the crash and the fuselage was not injured and he was not even jarred. He lands frequently on small lakes on the duck flats, and if he happens to run over the shore in taking off he keeps right on through the grass and mud until the ship takes off. Mud has been found to be as good as water for these operations.

If the engine in your seaplane cuts out on the take-off, don't make a desperate effort to get back into the water. If there is any kind of a field ahead you can probably land without damage to yourself or your ship. A veteran seaplane pilot recounts the experiences of others who have done it and walked away with neither doctors' nor repair bills.

Cordova Air Service, Inc., also of Alaska, reported on a crack-up at Icy Bay. This pontoon landing would have been impossible to accomplish with a wheel plane but the floats took the shock, slowed the ship enough to save it and there would have been very little damage if one wing had not hooked a tree. Not a soul was put out of his seat. The ship hit the timber at a speed of 115 m.p.h. and no one received even a scratch or bruise. The ship was salvaged as well as the pontoons.

The consistency of the written record, reenforced by many long discussions with George Edwards on the details of his deliberate runway landing, quite naturally brought the study to step number two, and several plans were soon being considered for the making of a series of deliberate landings under varying conditions and technique in order to establish the best way to do it. Mike Murphy and his "show" at the Air Races was chosen as the most practical solution for conducting these tests. It should be understood, however, that in spite of the spectacular nature of his much publicized capers, many days of careful test flying had preceded the performance at Cleveland, during the course of which some excellent data on just how it worked was collected.

Mike's ship was a 50 hp. Continental Cub on Edo 1140 floats, a combination, incidentally, which had only but very recently been licensed. Each float had an eighth inch steel rubbing strip fastened with countersunk machine screws to the bottom of its conventional dural keel. *With this single exception the ship and float gear was absolutely standard in every way.* It's amusing, by the way, to learn how the first tests were made.

Much talk and planning had naturally preceded the actual flying, and most of it quite obviously centered about getting the ship into the air in the absence of suitable water. Strips of greased canvas was one of the suggestions, and another was the automobile towing method used for gliders, and not a bad idea in an emergency, for low powered seaplanes, if certain precautions were taken. Mike finally decided, however, to fall back on an automobile truck as the easiest solution, since it had already been so successfully used in one of his land plane take-off stunts the year before.

The truck launching plan worked perfectly and Mike made his first landing on the turf of the airport at Findlay, Ohio, without incident. While waiting for the truck to drive

(Turn to page 84)

FORCES Acting on the Catapult Car

The second of two articles on assisted take-off

By Captain Holden C. Richardson

THE PROCESS OF LAUNCHING AIRPLANES by means of a catapult requires that work be done in a very short interval, in consequence of which high power is involved. This power is principally expended in energizing all those parts set into motion in order to bring the airplane up to launching speed. A minor portion of the work overcomes friction, and a very minor portion overcomes the air resistance of the catapult parts.

The excess of propeller thrust over that required to overcome the combined induced drag and profile drag of the wing and the parasite drag of the airplane assists the catapult engine in doing the work required. Actually this assistance is of minor importance. The "reserve thrust" of the propeller is at its maximum at the start at which time it equals the "standing thrust." But as the speed increases this decreases in amount even though the propeller efficiency increases rapidly. In addition the combined induced drag and profile drag of the wing and the parasite drag of the airplane increases with the square of the speed, until equal to that of the airplane at the chosen launching speed and attitude.

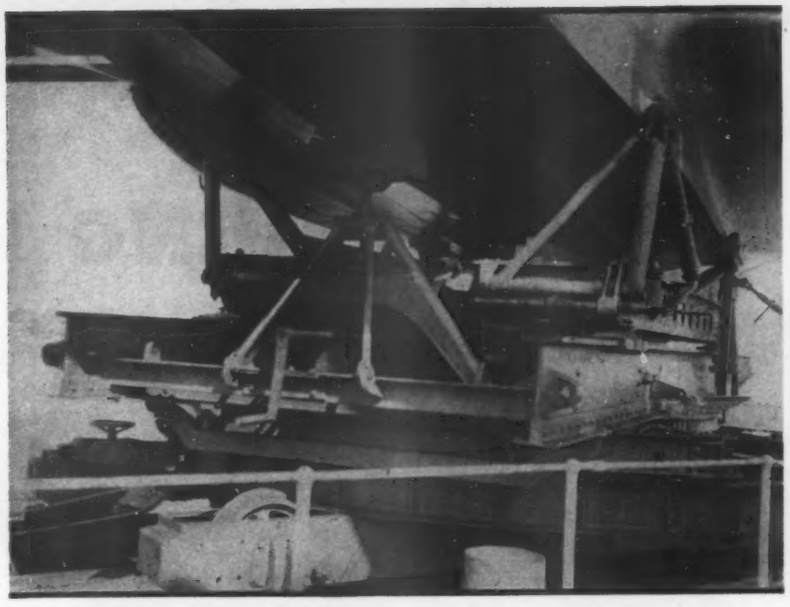
Theoretically it would be desirable to maintain the accelerating force at a constant value throughout the accelerated portion of the run, for this would require the least possible force to be transferred to the airplane structure and reduce the reinforcement and weight required to be added to the airplane.

Practically it is difficult to attain a constant force throughout the working stroke for a number of reasons some of which vary with the type of engine employed. The flywheel type of engine can be designed to give a close approximation to constancy. Pressure types such as air, hydraulic, air-hydraulic, and the powder types all involve a drop in pressure due to the increased flow required as the velocity increases and except to some forms of hydraulic types a drop in pressure in the reservoir. In general, some form of metering becomes necessary. The rapid reduction of reserve thrust requires compensation if constancy is to be closely approximated.

It is undesirable to instantly apply the full force of the catapult engine at the start of the stroke, while on the other hand it is necessary to apply a force in excess of the standing thrust to eliminate whip in the towline and any possible over-running of the towline before the catapult gets into action. For this reason it is desirable to allot a small portion of the initial travel of the catapult car to building up the force comparatively gradually. It is also desirable to allot a small portion to the end of the stroke to the reduction of the propelling force of the catapult to zero at the instant the airplane is released. Both of these factors add to the length of the working stroke and reduce the effective force below the maximum. The net effect of these factors is a necessary departure from the ideal with the result in general that, upon release of the car, the force as the car starts from a minimum well in excess of the standing thrust and rises rapidly to a maximum but this maximum is not sustained. It then falls away steadily toward the end of the run where it rapidly fades to that of the propeller thrust alone, or in other words the catapult thrust falls to zero at the instant the airplane is released.

At the instant of release the necessary energy has been delivered to the airplane which then continues to accelerate under the influence of the reserve thrust of the propeller. At the same instant the catapult engine has ended its working stroke. But the piston, piston-rod and crosshead with the crosshead sheaves, the towline, the fixed sheaves and the catapult car all contain energy which must be absorbed in bringing these parts to rest, and this can not be done instantly. Since the space allotted for this purpose is small, the force required to bring these members to rest is high, and approximately the direct ratio of the working stroke to the decelerating stroke. The car and a portion of the towline are moving at the launching velocity. The piston, piston-rod, crosshead, and crosshead sheaves are moving at a fraction of the launching velocity. Portions of the towline are moving at stepped down velocity and in addition the sheaves are rotating at stepped down velocity. The summation of these energies represents the major portion of the work done by the catapult engine, and because of the short stroke allotted to dispose of this energy the means to be used require a design of importance at least equal to that of the launching means. In fact the problem closely resembles that of absorbing the recoil of a main battery gun and one method frequently used employes that means. But there is a difference in the additional problem of absorbing the energy of the "blow" involved as the car contacts the buffer at launching speed and sets the arresting cylinders to work. In the case of the gun these buffers are attached to the gun yoke and start their work as soon as the gun starts its recoil, but in the case of the catapult the buffers are at rest until the car makes contact. The result is the same as if the recoil piston and rod and the fluid set in motion on contact were to strike a blow at launching velocity to a stationary car. One method of solving this is to put a buffer on the buffer. In the earlier applications of the catapult the "blow" was avoided by the use of knife plates fixed to the car entering between stationary friction plates under high initial pneumatic pressure. This method resembled that used during the Civil War to absorb the recoil of main battery guns.

While it is desirable to launch the airplane in the attitude for obtaining full lift at launching speed, it is not essential that this requirement be met.



Car of the compressed air operated catapult aboard the Schwabenland.

To meet it may require a wing setting which would involve an awkward and inefficient nose down attitude of the plane at cruising speed with a forward slope of the decks and passages which would be uncomfortable for the crew and passengers. But on the other hand if the wing setting is not changed the conformation and disposition of the fuselage or hull may be such that folding frames separating the car from the plane will be required, and these may take on ungainly proportions in providing necessary clearance at the instant the plane is released and while it passes on over the car which is coming to rest.

If tumbling frames are used, means are required to bring them to rest in the folded position without rebound. Hinged friction plates are satisfactory for this purpose.

However, in practice, it is found that if the launching speed exceeds the minimum flight speed, even though the airplane is not fully airborne, at the attitude of launching, the trajectory of the nearly airborne craft is such that only a small clearance is necessary to avoid any possible contact, and this is particularly true if tumbling frames are used.

Besides this, under launching conditions, it is possible to depress the tail of the plane immediately after release, and still without danger of contact and thereby to obtain the few degrees increase in the angle of attack and the full lift required to avoid any appreciable settling. Or, without changing the incidence of the wings settling may be acceptable, and such settling in itself gains for the wings the necessary incidence without introducing the drag involved with up-elevator.

A compromise as to the attitude of the airplane at release is therefore possible, which in a measure eliminates excessive wing setting and excessive incidence of the airplane in its setting with reference to the car. This avoids a clumsy arrangement of the supporting means while insuring safe clearance in launching with adequate control of attitude the instant the plane is released.

VIEWED in the light of distance traveled the events of the launching present a very different appearance than when viewed in the light of the elapsed time. The short space in which the force increases from the time the car begins to move until the maximum force is exerted involves a relatively large proportion of the launching time, whereas the short distance allotted to the cessation of the catapult force just before the plane is released requires a very small proportion of the launching time. Likewise the distance from the instant of the release of the plane until it is clear of the launching car is traveled at launching speed and the time interval is very small. Since the launching time is of the order of two to three seconds at the most, even a relatively large proportion of the launching interval is actually a very small portion of time.

So much of the catapult force stores energy in parts which must be brought to rest after the airplane is released that it becomes of considerable interest to keep down the weights and velocities of the different parts of the catapult. The action is so rapid that automatic means must be relied on to control the functioning of the different parts with the proper degree of precision and in a trustworthy manner.

The principal use of catapults to date has been in operation from aboard naval or merchant ships. Generally the type of catapult used provides a turntable mounting. With such installations it is usually possible to arrange to launch the airplane directly or nearly into the wind by changing the heading of the ship, and if the turntable is available by training the catapult. Due to weather conditions or conditions of the sea this is not always practicable, particularly if there is a ground swell from an unfavorable direction which would cause the ship to roll. However it is not essential that the airplane be launched directly into the wind and a cross wind is not as detrimental as might appear on first thought. It does make provision against lateral rolling of the airplane on the catapult car during the power stroke an essential requirement.

If at the time of launching the wind is from forward relative to the airplane, the resultant wind resolves itself into an increase of air-speed over that of the catapult launching speed which produces an excess of lift at the time the airplane is released. Until then the cross wind can have no effect and in the short interval of flight while the plane is clearing the car it can produce no appreciable change in the path of the airplane. But as soon as the airplane is released from the car it is under the pilot's control and it is only necessary to combat a temporary "skidding" condition. When practicable it is of course preferable to train the catapult into the resultant wind. For shore based catapults the turntable type is very desirable, permitting all launchings to be made directly into the wind.

Specific types of catapults and specific types of airplanes require particular forms of construction. The forces involved and the distribution of the work therefore depend on many variables. The attempt has been made to indicate the nature of the forces to be encountered, and by way of illustration the air type catapult, using an air cylinder with a bank of reservoir cylinders, and provided with a piston, piston-rod and crosshead, crosshead sheaves, fixed sheaves, guide sheaves and a multiple wire rope purchase towing a combined launching car and cradle riding on slippers on a pair of guide rails has been the basis of discussion. These have sufficed to indicate the principal factors affecting design for a given performance.

DC-5 Goes High Wing

Latest Douglas Transport has tricycle landing gear and is designed for short operations and frequent schedules

NOW IT CAN BE TOLD that the Douglas DC-5 is a high wing monoplane with tricycle landing gear for short range operations with 16 passengers. Ability to get in and out of small fields, low wing loading, and simplified maintenance are features of the design. In the tricycle landing gear all three wheels are retractable and the main wheels are sufficiently far behind the center of gravity that brakes may be fully applied on contact with the ground. The wing flaps are the same as those of the DC-4, permitting effective tail surface control when lowered.

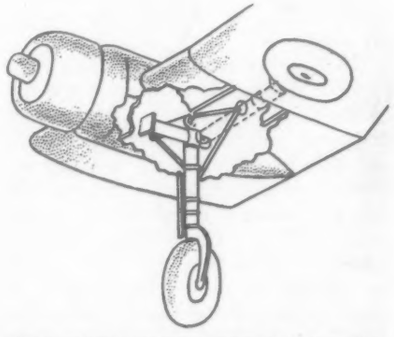
Interchangeability of many parts with those of the DC-2 and DC-3 is an important consideration for operators. Among the standardized structural units are engine mounts, collector rings, control columns, rudder pedals, and pilot seats.

Dictated partly by maintenance considerations the high wing arrangement allows an overhead control system with cables passing directly from the control station to the wing spar and then to the engines. This eliminates control pedestals and complicated collections of pulleys and fairleads. Cover plates in the cabin ceiling and on top of the fuselage provide easy access. Another feature contributing to simplified maintenance is the position of the ship on the ground. Quick access to the fuel system strainer battery, radio, and other power plant parts is therefore possible.

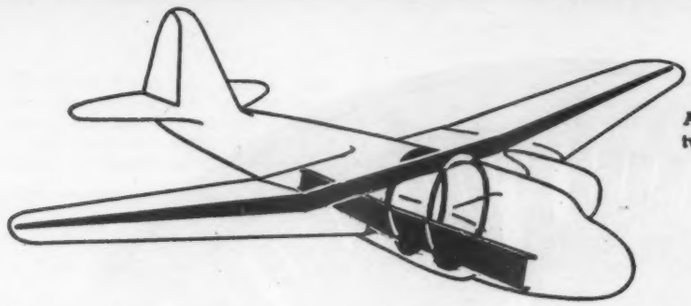
Engines nacelles are in the center section of the wing. The installation provides 15 in. fuselage clearance for the 11 ft. 6 in. full feathering propellers. Engine mounts, controls, and certain installation parts forward of the firewall are interchangeable with those of the DC-3. Rubber shock mountings are used to absorb vibration. Engines are Wright Cyclone F-62 or G-2 or the Pratt & Whitney Hornet 21E-2G. Two wing tanks carry 550 gal. of gasoline with cross feeding arrangements. The tanks are of oval design without baffles.

Landing gear is of the single strut type used in the DC-4. Main wheels retract outward and up into the wing by hydraulic control. Simultaneously and also hydraulically the nose wheel retracts into a well in the fuselage but extends sufficiently to be useful in a belly landing. If the hydraulic system should fail, the landing gear is designed to drop by gravity and lock in extended position. Tread is 22 ft.; wheelbase, 19 ft.; main wheels, 15.00x 16; nose wheel, 23 in., smooth contour. 20x10 air wheels are optional. Hydraulic brakes are standard.

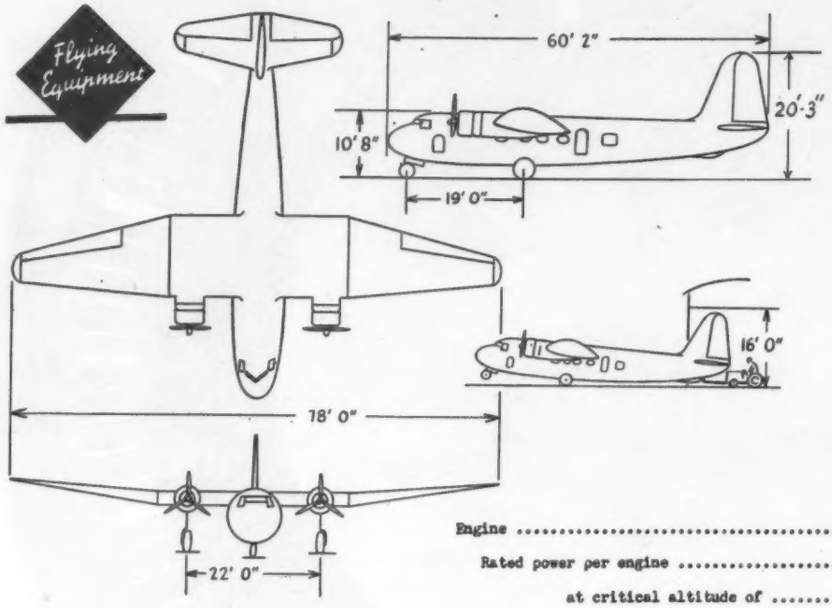
An all metal, full cantilever monospar wing with fabric covered control surfaces has been selected in the design. The entire wing is a torque-stiff structure and incorporates many improvements. Wing span is 78 ft.; wing area is 825 sq.ft. Wing loading is only 22.1 per sq.ft. which is almost 30 per cent less than other recent designs.



Main wheels retract outward into wells in the lower surface of the wing.



A stout keel beam is tied to the wing spar by two circular truss frames.



The tail group consists of a single rudder and elevator with vertical and horizontal fins. They are unusually large to provide sufficient control at low speeds. All tail surfaces are of monospar construction. The fixed surfaces are metal covered while movable surfaces are fabric covered. Surface controls are balanced both statically and dynamically, the section forward of the hinge balancing that directly to the rear of the hinge, thus eliminating torsional flutter and eccentric hinge loads.

The fuselage is of the conventional semi-monocoque type with longitudinal stiffeners and stressed skin covering, similar to that of the DC-3. A stout fore-and-aft keel or beam is laid along the bottom center line of the ship, running from the nose wheel well to the rear of the main cabin. This beam not only adds rigidity to the fuselage structure but acts as a skid in case of landing with wheels up. Two truss frames encircle the cabin and tie into the wing structural members. The cross section of the fuselage is an absolute circle thus providing a very efficient aerodynamic shape and a high strength-weight ratio. Overall length is 60 ft. 2 in.

Although the pilot's compartment follows the DC-3 in general arrangement, numerous innovations for ease of control, comfort, and unobstructed vision are incorporated. Engine controls are slightly overhead but practically at eye level. This position is particularly advantageous when landing. Flight instruments including Sperry artificial horizon and directional gyro (standard equipment) are conveniently arranged in the center panel. Seats may be adjusted to any position. The rudder pedals are adjustable and incorporate toe braking. Flap gear is on the right side of the pilot while the landing gear control is at the co-pilot's left. Exceptionally deep side windows allow wide vision downward. The windshield is at proper angle to eliminate glare and is in two sections with provision for opening in bad weather without rain or snow striking the pilot's face or getting in the pilot's compartment.

Specifications furnished by the manufacturer are as follows:

Engine	Cyclone F62	Hornet SIE2G	Cyclone G2
Rated power per engine	760 hp	750 hp	850 hp
at critical altitude of	5800 ft	7000 ft	5800 ft
Sea level Take-off power	900 hp	875 hp	1000 hp
Emergency power	810 hp	800 hp	None
Power loading rated	12 #/hp	12.17 #/hp	10.9 #/hp
Take-off	10.15 #/hp	10.42 #/hp	9.2 #/hp
Emergency	11.25 #/hp	11.40 #/hp	10.9 #/hp
Wing loading	22.1 #/ft^2	22.1 #/ft^2	22.1 #/ft^2
Speed - maximum	215 mph	217 mph	224 mph
at altitude of	6800 ft	8000 ft	6800 ft
Cruising, 10,000 ft (3048 m) @ 65% power	182 mph	182 mph	192 mph
60% power	176 mph	176 mph	185 mph
50% power	157 mph	157 mph	169 mph
Landing	64 mph	64 mph	64 mph
Ceiling - Normal Service	21,700 ft	22,600 ft	23,400 ft
Absolute, single engine	10,550 ft	10,630 ft	11,000 ft
Service, single engine	* 9,250 ft	* 9,370 ft	* 9,650 ft
Maximum rate of climb - critical altitude	1,050 ft/min	1,000 ft/min	1,225 ft/min
Sea level, climb	1,380 ft/min	1,320 ft/min	1,580 ft/min
Sea level, 1 engine climb	215 ft/min	210 ft/min	225 ft/min
Take-off run, no flaps - sea level	800 ft	840 ft	770 ft
5000 ft (1524 m)	895 ft	950 ft	890 ft
Take-off over 50 ft (15 m) obstacle	1440 ft	1510 ft	1385 ft
Weight empty	11,500 lbs	11,500 lbs	11,756 lbs
Total Useful Load	6,750 lbs	6,750 lbs	6,494 lbs
Total Gross Weight	18,250 lbs	18,250 lbs	18,250 lbs

* Single engine service ceiling increases at constant rate of 500 ft. for reduction of each 550 lbs. in gross weight.

Flight Security

Never before in aviation history has quality instrumentation been so vitally important as it is today . . . and as it will continue to be. The development of "instrument-flying" is, of course, the reason. Because Pioneer builds only instruments of highest attainable precision, of utmost practical sturdiness, and of most modern type, Pioneer Instruments spell Flight-Security.

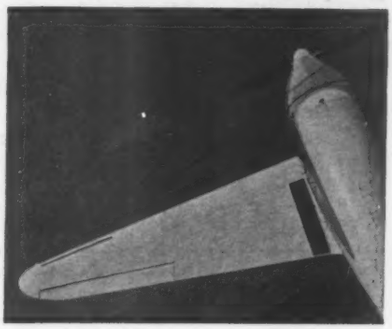
PIONEER

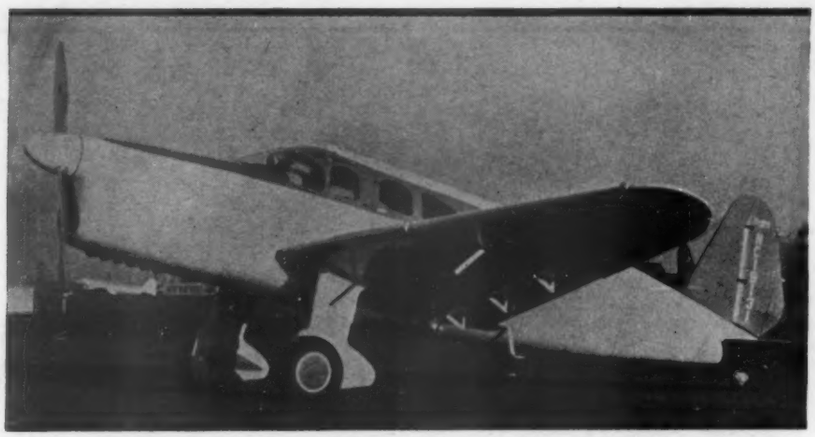
INSTRUMENT COMPANY, INC.

(Subsidiary of Bendix Aviation Corporation)

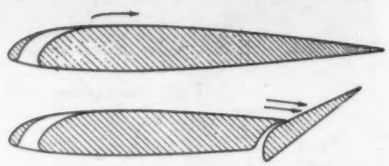
754 LEXINGTON AVENUE • BROOKLYN, NEW YORK

The Clark F-46A has built-in slots over twenty-five per cent of each wing. Another very modern feature is an N.A.C.A. anti-stall warning device mounted on the left wing.





The Case for
BUILT-IN SLOTS



Among other advantages, the built-in slot markedly increases control beyond the stalling point.

Flying Equipment

Col. Virginius E. Clark writes us on the subject of built-in slots—a singularly timely topic as designers make more and more use of highly tapered wings.

WE HAD A CHANCE recently to climb through the new Clark F-46A at the Newark Airport and to talk with Col. Clark about its unique fuselage construction — of a near-plastic substance known as Duramold. We have been promised a release of full construction details for an early issue. Meanwhile we have found equal interest in the reports that have reached us of the ship's excellent flying qualities. Col. Clark attributes them largely to the use of built-in slots. A few days after our visit, we were fortunate enough to have him write us on the subject. The following are excerpts from his letter—

"I have incorporated this type of slot in the '43' and in the '46', both highly tapered, low-wing cantilever monoplanes, for the primary purpose of making it safe to get into and out of very small landing fields surrounded by obstacles. Without some device to accomplish the same purpose there is entirely too much danger of "going off on a wing" at slow air speeds, especially with highly tapered wings.

"Perhaps a brief non-technical resumé of the action of this type of slot would be interesting at this time.

(1) The angle of attack of the portion of the wing affected by the slot—the region of the upper surface in rear of, and slightly inboard of, the slot—at which the maximum lift coefficient occurs is increased by about fourteen degrees. Thus the slot delays the stalling of the tip of the wing (the portion which otherwise stalls first on a highly tapered wing) and gives a favorable rolling moment due to roll at mean angles of attack of the wing as a whole much higher than that angle at which the portion of the wing inboard of the slot stalls. At very slow air speeds, when the lift of the inner portion of the wing is being reduced, the lift coefficient of the wing tip is increased with increase in angle of attack. Thus there is induced a righting moment in roll due to roll and the danger of "falling on a wing" with accompanying incipient autorotation is averted.

(2) Lateral control beyond the stall. At high angles of attack—beyond the stall of the wing as a whole—the leading edge vane forces the air (the flow of which would otherwise be violently turbulent and reversed in direction) to flow smoothly from front to rear over the upper surface of the aileron. Thus the up-turned aileron is forced to give favorable and effective rolling moment at very slow speeds,—when the wing inboard has passed the stall.

(3) The effect is not only to increase the maximum lift coefficient near the tip of a highly tapered wing but also to increase the maximum lift coefficient of the wing as a whole. The '46', with N.A.C.A. 23 airfoil family and with balanced split flaps having .12 of the wing area, shows, in careful tests in flight away from ground influence, a maximum lift coefficient of 2.35.

(4) Low aerodynamic drag. As compared to the Handley-Page, Leigh and other types, the aerodynamic drag of the airfoil as a whole is quite low. the reduction in speed of the '46', with slot open is negligible as compared with the condition of slots closed for test. The reason for this is obvious in that the sections of all three airfoils, including the original or circumscribed profile, are quite efficient. In the low lift region the flow of air is not disturbed by the slot to an appreciable extent.

(5) Simplicity and reliability. Obvious, as there are no moving parts.

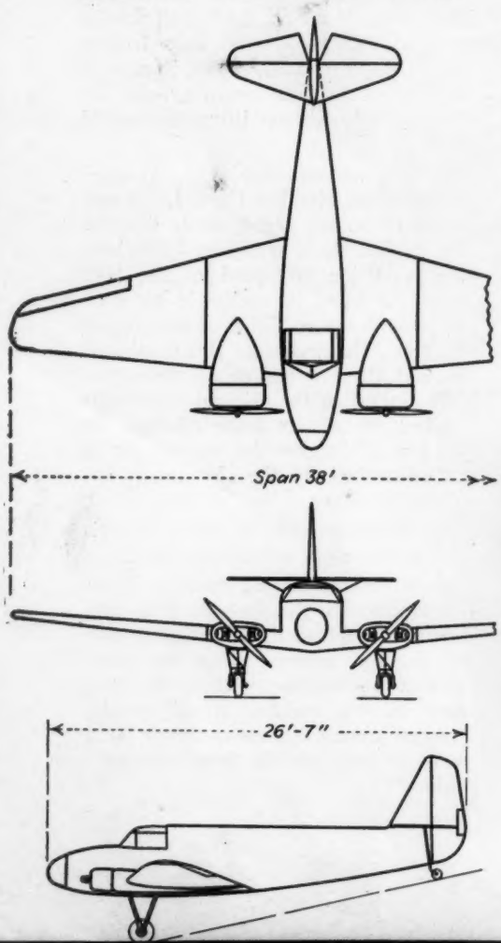
(6) Favorable yawing moments from displacement of the ailerons. With differential movement of 32 degrees and 14 degrees, aileron turns are easy, smooth and regular, without displacement of the rudder, at all speeds. Aileron control forces are very light with no over-balance under any condition."

Funk Monoplane with Ford V-8 converted engine

Twin-engine Lightplane

FLIGHT TESTS are now being conducted on a new two place twin-engine light cabin airplane powered with two Continental 50 hp. engines. The plane, developed by Sterling Edwards, of South San Francisco, Calif., is shortly to be placed on the market in the medium price range, probably for less than $5,000. The Edwards MBM-1 is a low wing monoplane with full cantilever wing and strut braced tail surfaces. Wing airfoil section is NACA 23012 and the wing is tapered in plan form, but not in thickness, which provides unusual stability at low speeds. The center section is integral with the fuselage, being of steel tube structure with a single spar braced in drag and torsion by an aluminum alloy sheet covered leading edge. Outer wing panels are also monospar type with a single plywood box-type spar located at 28 per cent of the chord. Torsion and drag are carried by plywood covered leading edges. Remainder of the wing, and the fuselage, except forward of the cabin, is fabric covered. The forward part of the fuselage is covered with aluminum alloy sheet over steel tube structure. The landing gear on the Edwards is fully retractable by hand. Seating arrangement is side by side with two control wheels and a central throttle pedestal. The cabin is covered with a sliding hatch which may be opened in flight. A thirty gallon tank provides cruising range of 400 miles. Performances based on flight tests conducted to date, and general specifications as released by the manufacturer, are as follows:

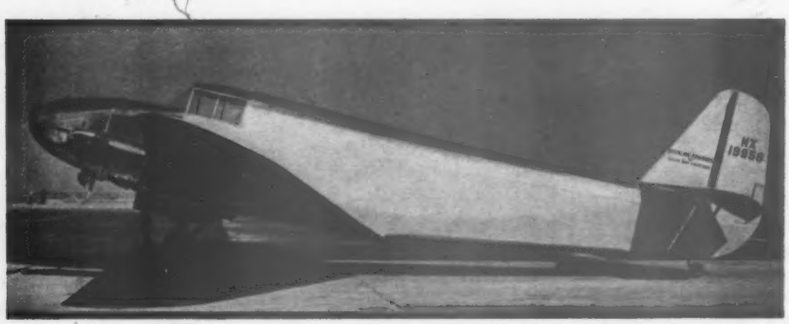
Span .....38 ft.
Length .....27 ft. 6 in.
Height .....7 ft.
Landing gear tread.....9 ft.
Wing area .....216 sq.ft.
Wing loading .....8 lb./sq.ft.
Power loading .....17.5 lb./hp.
Empty weight .....1186 lb.
Useful load .....564 lb.
Gross weight .....1750 lb.
Power....two Continental A50-3 engines
Fuel capacity .....30 gal.
Oil.....4 gal. (two per engine)
Propellers .....Sensenich 74 in.
Performances:
Maximum speed sea level.....122 m.p.h.
Cruising speed.....108 m.p.h.
Cruising range.....400 miles, or 3 hr. 45 min. (at 4 bal. per engine per hr.)
Climb .....800 ft. per min. from take off at sea level



New Rearwin

Third model to have side-by-side seating

REARWIN AIRPLANES has announced that a third plane will be added to its line, supplementing the well-known Sportster and Speedster models. Known as Model 8000, the new Rearwin is now in the design stage, but will be placed in production shortly. Featuring side-by-side seating, the Model 8000 is a two-place cabin monoplane powered with the 90 or 125 h.p. LeBlond engines. Estimated cruising speed of the 90 h.p. model is 110 mph. and of the 1.25 h.p. model, 130 mph. Range planned is 600 miles, with 34 gallons of fuel.

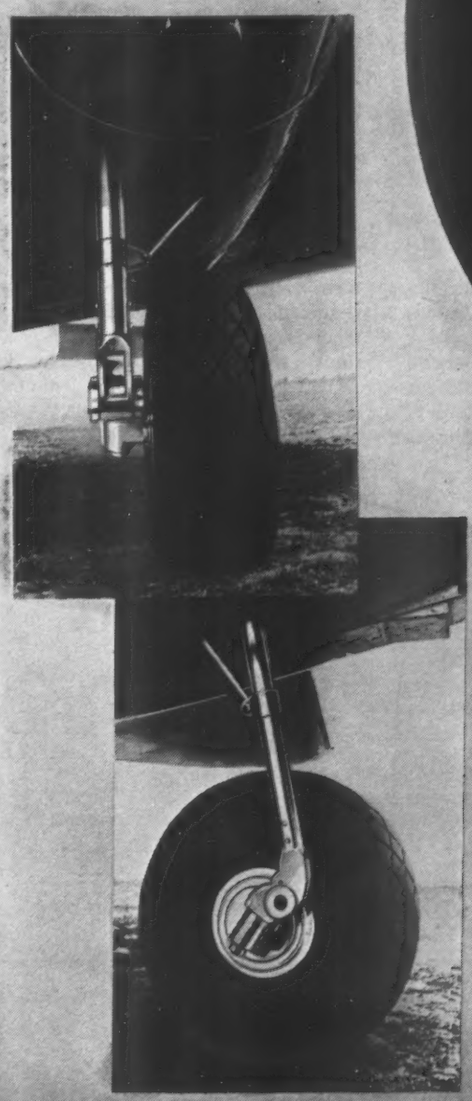


The Edwards MBM-1 with two Continental 50s

". . . a new and outstandingly interesting aircraft wheel."
"FLIGHT"

". . . likely to be the most technically valuable of all Mr. Dowty's important contributions to the development of undercarriages."
"THE AEROPLANE"

These photographs show a DOWTY wheel cantilevered from a retractable strut.



THE

DOWTY

WHEEL — *the greatest advance in aircraft landing gear in twenty-five years*

The Dowty wheel, made in four standard sizes accommodates all aircraft between 6,000 and 24,000 lb. weight. The springing, shock-absorbing and brake mechanism is contained within the hub of a low-pressure tyred wheel. Among its advantages are :—standardisation and interchangeability over a range of aircraft types ; saving of undercarriage weight ; reduction of undercarriage cost ; more rapid production and smoother taxying, take-off and landing characteristics. Large vertical travel can be provided with ease.

PATENTED IN ALL COUNTRIES

Cables : COMPONENTS, CHELTENHAM

AVIATION RADIO

Dialing the Air Waves with Don Fink

Airphone

Single-Unit Transmitter-Receiver Weighs 12 lb.

DESIGNED to fill the needs of private aircraft, the latest item of equipment released by the Taylor Airphone Products, of Long Beach, Calif., is a complete radiophone in one unit. The receiver and transmitter are mounted in one case, weighing 12 lb. measuring roughly 6 by 6 by 6 in. A power supply unit in a somewhat smaller case completes the installation. The receiver tunes the band from 170 to 410 kc, draws 2½ amps at 6 volts, has a range of 100 miles. The transmitter, crystal-controlled on 3105 kc, has an output of 10 watts and draws 5½ amps at 6 volts. Using a fixed antenna, the range is 35–40 miles. The complete equipment, including transmitter-receiver, power supply, microphone, headphones, cables and instruction booklet lists for $225. Other models, for use at other frequencies and/or with 12-volt power supply are available.

75 Mc Receivers

Airlines and Manufacturers Prepare for New Beacon Service

NEWS to the effect that the new 75 Mc beacon service will soon be a major factor in airlines operation has appeared from two fronts. Firstly, J. G. Flynn, Jr., superintendent of communications for American Airlines announces that 75 Mc receivers are being installed throughout the entire AA fleet, and that the installation is nearly completed. Secondly comes a commercial release from the Western Electric Company announcing the availability of a new receiver, type 27A, intended for 75 Mc marker beacon reception, and approved by the Bureau of Air Commerce.

The new receiver uses six tubes, with a crystal controlled oscillator tuned permanently to provide a 6.235 Mc intermediate frequency from the 75 Mc input. The i-f channel is such that the attenuation at the edges of a 60 kc band is 6 db, 60 db at the edges of a 300 kc band. The receiver may be equipped with from one to three signal lamp control circuits, responsive to modulating frequencies of 400, 1300 and 3000 cps. The lamp control circuits operate with a minimum input signal of 150 microvolts, 30 per cent modulated. The signal-to-noise ratio is 30 db at this minimum signal level. Automatic gain control operates throughout the range from 150 microvolts to 0.1 volt. The weight is 15 lb. (one lamp control circuit only); the dimensions 20 by 5 by 8 inches; the power requirements 3.5 amps at 12 volts.

Position Finders

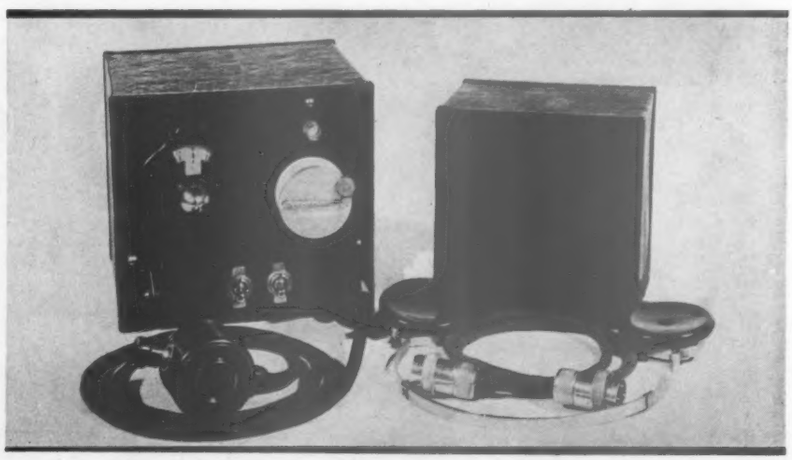
Pennsylvania Central Pilots Use Stark Instrument

THE STARK POSITION FINDER, described some months ago in these columns, has recently been put in regular service by the Penn Central System, according to a recent announcement by the Air-Track Corp., manufacturers of the device. The finder consists of a circular frame in which a transparent map, representing an area 520 miles in diameter is placed. Two sets of coordinate lines, which may be rotated with respect to each other, are used to transfer the directions indicated by a radio compass to two stations of known position, the intersection of the proper coordinates shows the position of the plane. According to the announcement, the Penn Central System has released the instrument to pilots of other airlines, as well as private and military flyers.

Antenna Parts

A relay and a loading coil for send-receive applications

DAVE LITTLE of RCA, Camden, sends word that two new antenna gadgets are now available from the Aviation Radio Sales Department. They are an antenna change relay, and a loading coil, which may be used separately or together. The relay, type AVA-24A, is intended primarily for send-receive switching. Weighing less than one pound and carrying CAA approval, the relay is fitted with a toggle control switch and an air-tight aluminum cover. The loading coil, type AVA-39, is used for connecting the transmitter to the fixed receiving antenna, for short-distance transmission from the ground. The coil has the proper dimensions to insure maximum energy transfer to the antenna under these conditions. Since a switching arrangement is necessary under these conditions, the loading coil is so constructed that it may be mounted directly on the case of the AVA-24A relay.



Taylor Airphone Transmitter-Receiver

Another RECORD YEAR FOR WRIGHT

Sales and shipments of the Wright Aeronautical Corporation reached a new record-high during 1938. Shipments were increased 27% over 1937—the previous record year in Wright's history.

In airline service Wright engines were flown a record total of approximately 70,000,000 air miles during 1938—an increase of 30% over 1937.

Record endurance flights were also established during 1938 with Wright-powered aircraft. Among the most noteworthy was the U. S. Army Air Corps "good-will" flight to Buenos Aires and return—a distance of 12,000 miles covered in 66 hours of flying time by 6 Cyclone-powered Boeing B-17 four-engined "Flying Fortress" Bombers.

The outstanding flight of Howard Hughes and his four companions Around the World in 3 days, 19 hours in a standard, twin-engined Lockheed 14 commercial transport powered by two 1100-H.P. Wright Cyclones was another notable example.

Wright takes this opportunity to again thank all who contributed so generously to making these sales, operations and endurance records possible—the U. S. Army Air Corps, the U. S. Navy Department, commercial and military aircraft manufacturers, commercial airlines of the United States and abroad, and private owners of Wright-powered aircraft.

"Fly With Wright The World Over"

WRIGHT AERONAUTICAL CORPORATION
PATERSON NEW JERSEY
A Division of Curtiss-Wright Corporation

WRIGHT *Aircraft* ENGINES

The Birdmen's Perch

It's kinda' a surprise to us that there aren't more *correct* answers to our Aviation Quiz. Maybe it's because you smart lads don't bother sending in your papers to be corrected. Whether you know the answers or not, let's hear from you. We'll print the names of the Quiz Club members in an early issue.

MAJOR AL WILLIAMS, alias "Tattered Wing-Tips,"
Mgr. Gulf Aviation Products, Gulf Bldg., Pittsburgh, Pa.

DON'T COUNT YOUR CHICKENS DEPT.

A pilot on a recent hop encountered a large flock of ducks. Coming on them from the rear, he caught up just fast enough so that every 45 seconds the number of birds in sight doubled itself. If he saw the first at 12:03 P.M. and could see them all at 12:12, at what time could he see half of them? And, just to make it difficult, how many birds were there?

(Old T.W.T's almost ashamed to admit it, boys, but he missed the boat on this one. If you want to show him up, send in your answer to be checked.)

CLASSIFIED ADVT.

WANTED:—Party to tell Gulf Oil Corp. how to make use of all the *extra* sludge and dirt taken from Gulfpride Oil. Gulf's exclusive Alchlor process *used in addition to conventional methods* removes as much as *20% extra waste* from this 100% Pure Pennsylvania oil.

ALSO WANTED:—Party or parties interested in obtaining super airplane lubrication. Ask for Gulfpride at the Sign of the Gulf Orange Disc.

AVIATION QUIZ

1. How did the Wright Brothers decide who was to fly first?
2. What famous writer of South Sea tales was a member of the Lafayette Escadrille?
3. Who was the first stunt flyer?
4. Who is the present chairman of the Civil Aeronautics Authority?
5. Give within one million the number of passenger miles flown by airlines per passenger-fatality in 1937.

THIS MONTH'S WHOPPER

Hi, Major!

Pal of mine's wife was the worst back-seat driver in Deaf Smith County, Texas. Why, she used to bring her sister along on auto rides so there'd be someone to keep up the heckling when she had to pause for breath.

That was before my friend ran outa' gas one day near the airport. Then his wife and sister-in-law both went to work at once! Radio operator half mile away turned off his set 'cause the interference was so bad. And Hank Sparks, my friend, claims his ears was almost numb before the gals got their second wind and really went to town on him.

Fortunately there was a supply of Gulf Aviation Gas at the airport. So Hank carted over a couple of gallons and sloshed it into the tank quick for fear the words those females were screeching at him might set it on fire.

Then he crawled back under the wheel and stepped on the starter.

Major, I . . . well . . . I . . . what I mean is—you can't expect no man to believe this except a fellow like yourself that has a faint idea of how powerful Gulf Aviation Gas really is! But when Hank put his foot on the accelerator and let in the clutch, that old car picked up so fast the words from the rear seat never had a chance to reach the front! All he did was drive around in serene unheeding silence for a couple of hours and when he got home those gals were so hoarse they couldn't talk for two weeks!

Joseph G. Maglish

Gulf Oil Corporation and Gulf Refining Company . . . makers of

GULF AVIATION PRODUCTS

BUYER'S LOG BOOK

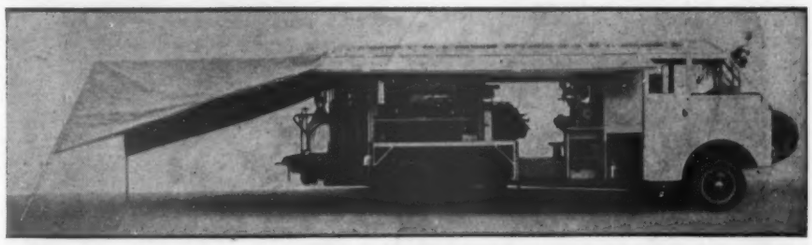
What's New in Accessories, Materials, Supplies, and Equipment

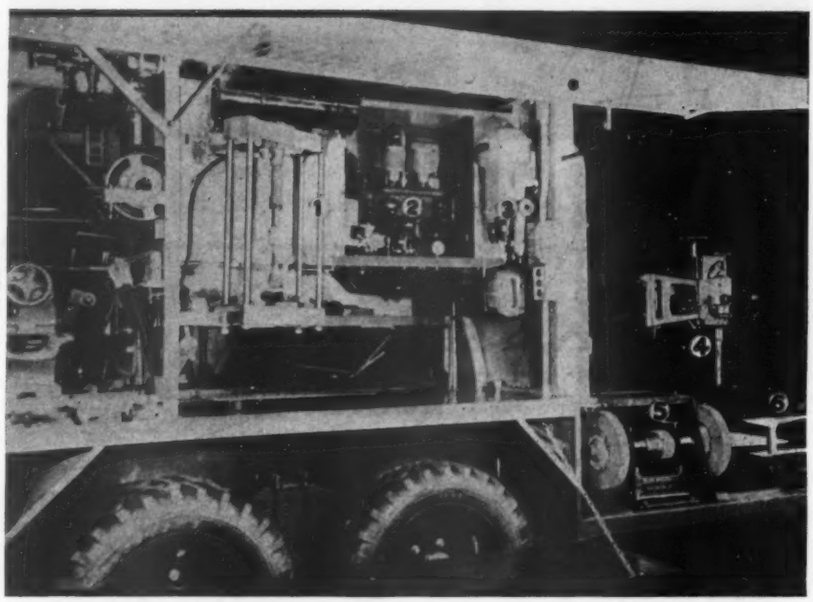
Couse Mobile Airport

Workshop on wheels carries all equipment for airplane and engine repair

A SITUATION sometimes embarassing to the airline maintenance crew is that of having to make repairs on an airliner that has been damaged in a forced landing at some remote intermediate field where no adequate facilities are available. To meet this specific need the Couse Laboratories, Inc., of East Orange, N. J., have developed a remarkable portable work shop which they call the Model CA-2 Mobile Airport. The Couse Mobile Airport is a self-propelled workshop for all aircraft and engine repair work, completely equipped with all tools and machinery, field lighting equipment, and two-way radio communication apparatus. Such a piece of equipment should also be invaluable for military work where operations are frequently conducted from out of the way fields, and for airline extension or experimental work where it may be desirable to conduct maintenance operations at some remote point for a period of time pending establishment of permanent facilities.

The Couse Mobile Airport will travel on a level highway at 45 mph and will climb a continuous grade of 35%. Weighing between 11 and 12 tons, depending on whether a spare airplane engine is carried, the CA-2 is 29 feet long, stands 9 feet high and is eight feet wide. Powerplant is a standard Ford 85 h.p. truck engine. The cab seats three and sleeps two.—AVIATION, *January, 1939.*





Left rear view of Mobile Airport. (1) Arbor press (2) compressor (3) electric still (4) drill (5) grinder (6) anvil. Above — The complete unit.

Mishawaka Chair

Latex Foam Cushioning and Form Fit Provide High Degree of Comfort

DEVELOPED after extensive research and experiment, a new type airplane chair has been announced by Mishawaka Rubber & Woolen Mfg. Co., Mishawaka, Indiana. The Mishawaka chair makes generous use of Latex cushioning, with slip covers for easy cleaning. The chair is designed to "absorb" the body, tending to make it a part of the chair and brace it against normal airplane movements. Unusually wide amplitude of movement is provided in the seat back and an improved degree of head support.—AVIATION, *January, 1939.*

Hydraulic Cable Stretcher

Device developed by Vultee handles several cables at once

ONE OF THE SPECIAL MANUFACTURING PROBLEMS in aircraft plants is to take the initial stretch out of control cables after they have been spliced and are ready for installation in the airplane. The ordinary spring-loaded cable stretcher does not maintain constant pull, but tends to ease the tension on the cable as it stretches. To obtain a constant pull cable stretcher the engineering department of Vultee Aircraft, Downey, Calif., has designed and had built a very simple and effective cable stretching machine which has proved thoroughly satisfactory in operation. The machine uses hydraulic pressure in a piston to obtain the stretching force, this pressure being developed by electric motor. The required pull is accurately set and held at any desired tension from zero to 6,000 lb. by means of a pair of by-pass valves, which accurately hold any required hydraulic pressure within the working range of the machine. Balancing yokes are provided to permit simultaneous stretching of one, two, or four cables. Total cable length that

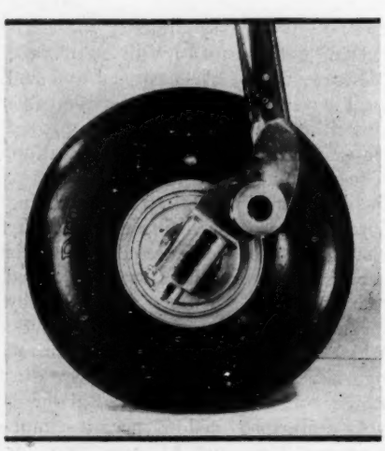
Operating the Vultee Cable Stretcher.

the machine will take is 30 ft., and a number of short cable can be hooked up and stretched in series to speed the stretching operation. Stretching is continued for one hour.—AVIATION, *January, 1939.*

Dowty Wheel

Shock Absorber Unit for craft of 6,000 to 24,000 lb.

AN OLEO-PNEUMATIC WHEEL UNIT with shock absorber travel up to 18 inches has been developed by Dowty in England and is being distributed through Aircraft Components Ltd., of Cheltenham. Four designs of the Dowty Wheel are available covering airplanes ranging from 6,000 to 24,000 lb. gross. For each size a standard brake and shock absorber are provided. Vertical wheel travel and shock absorber inflation pressure are variable. In the Dowty wheel the usual telescopic principle is replaced by a pin jointed arm support for the wheel, eliminating bending and racking loads. Attachment can be made by attaching the short arm of the shock absorber to a simple rigid strut. The unit can be used with the self-contained Dowty "Nutcracker" retracting strut. This wheel was on display at the Paris Show.—AVIATION, *January, 1939.*



Dowty aircraft wheel.

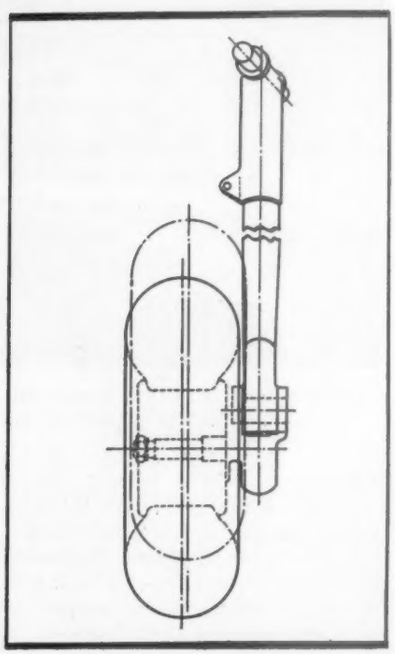


Diagram of Dowty wheel.

Hydroloid Parchment

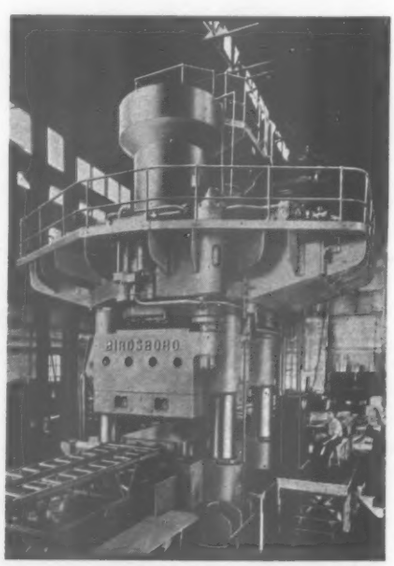
Paper resists water and fire and possess unusual wearing qualities

A NEW TYPE OF PAPER with remarkable physical properties has been offered for aviation applications. This paper is manufactured abroad and sold here by H. Scherbak of New York City. Mr. Scherbak is in a position to give convincing demonstrations of the water and fire resistance and the wearing qualities of Hydroloid Parchment. —AVIATION, *January, 1939.*

Birdsboro Press

World's largest unit exerts 5500 tons pressure

THE RUSSIAN GOVERNMENT has purchased a number of giant hydraulic presses designed and being built by the Birdsboro Steel Foundry and Machine Company, of Birdsboro, Pa. Platen area of the Birdsboro press is 200 by 90 inches and pressing stroke is 54 inches. A working pressure of 5,500 tons can be exerted. Speed and pressure are fingertip controlled and operation can be manual or automatic, as desired. The press is equipped with synchronized transferring means for loading the work into and simultaneously removing the finished work from the press.—AVIATION, *January, 1939.*



Birdsboro hydraulic press for aircraft work.

Firestone

Safety-built AIRPLANE TIRES

USED BY LEADERS IN EVERY BRANCH OF FLYING

John Jones

CONGRATULATIONS to Johnny Jones, able president of Jones & Humeston, West Coast Distributors of Aeronca Airplanes, and his Standard Aeronca "Chief" for their sensational Coast-to-Coast non-stop flight. Firestone is proud to have participated in this record making performance — for this was a supreme test of the impact-resisting qualities and extra safety-factors found in Firestone Safety-Built Airplane Tires.

Taking off at Los Angeles Airport with a total capacity load of 1900 pounds — almost twice the normal capacity load of the ship — Firestone tires carried the ship safely and surely into the air after a record short run of only one thousand feet. These were the same type Firestone Airplane Tires that are standard equipment on all Aeroncas.

Firestone Safety-Built Airplane Tires are constructed by master craftsmen to Firestone exacting specifications and are the only Airplane Tires built with these advantages.

1 Balanced Construction — an exclusive Firestone feature giving maximum impact-resisting qualities to the tires.

2 Gum-Dipping—a patented Firestone Safety-Factor that assures maximum protection against blowouts, and longer life to the tire.

Follow the example of leaders in every branch of flying — insist that your ship be equipped with Firestone Safety-Built Airplane Tires.

Pennsylvania Central Airlines, who have constantly maintained an enviable safety-record, use Firestone Safety-Built Airplane Tires.

Firestone Safety-Built Airplane Tires are tested on Firestone's Test Plane and meet exacting military specifications of the United States Government.

AIRPLANE TIRES • AIRPLANE WHEELS & BRAKES • AIRTEX SEATS & CUSHIONS

Listen to THE VOICE OF FIRESTONE featuring Richard Crooks and Margaret Speaks and the 70-piece Firestone Symphony Orchestra, under the direction of Alfred Wallenstein, Monday evenings over Nationwide N. B. C. Red Network

Copyright, 1939, The Firestone Tire & Rubber Co.

America's
FINEST SMALL PLANE ENGINE
OFFERS YOU
• Brilliant PERFORMANCE
• Proved ECONOMY
• Proved DEPENDABILITY

Continental A-50
AIRCRAFT ENGINE

The Continental A-50 has again won nation-wide fame by its performance in the recent non-stop coast-to-coast flight of 2785 miles.

Averaging 22.3 miles per gallon of gasoline, using only 3 quarts of oil at an average speed of 91 miles per hour and performing perfectly throughout the trip is proof of Continental's leadership in this field.

The Aeronca on this famous flight on Nov. 8-9, 1938 was powered with the CONTINENTAL A-50 Engine.
MILEAGE: 2785 — FUEL CONSUMED: 125 GALS. OR CONSUMPTION 22 MPG. AVG. SPEED, 91 M.P.H. MILES PER GAL. 22.3 TIME: 30 HRS. 47 MIN.

The Continental A-50 is now standard equipment on the following small planes:
AERONCA — LUSCOMBE — PIPER CUB — TAYLORCRAFT

Continental Motors Corporation
Aircraft Engine Division
12801 E. JEFFERSON AVENUE • DETROIT, MICHIGAN

Step-by-step methods for airplane mechanics

covering materials, construction, testing, servicing, and repair, especially of thin-sheet-metal airplanes

Just published

Airplane Maintenance

A Textbook for Airplane Mechanics

By John H. Younger
University of California

Allan F. Bonnalie
Boeing School of Aeronautics

and Nairne F. Ward
University of California
Boeing School of Aeronautics

353 pages, 232 illustrations, $3.00

This book presents the material needed by those who wish to become airplane mechanics in the large repair stations of national and international airplane lines, also a great many reference facts that will help the mechanic in his work. It gives practical information on materials and construction of airplanes and their parts, repair shop equipment and methods, servicing, testing, etc., with special attention to thin-sheet-metal airplanes. More than 50 experts have assisted in making a thoroughly authoritative book.

Typical Job Units

The book begins with an outline of the qualifications of an airplane mechanic and their importance in this specialized trade, and then goes thoroughly into all the essentials of the mechanic's work, his equipment, principles of structures, metal-working, etc., needed as a background for good work. Methods are clearly explained and fully illustrated, and job routine is made clear by over sixty typical step-by-step job units. Examine this book for ten days free. Mail the coupon today.

McGRAW-HILL ON-APPROVAL COUPON

McGRAW-HILL BOOK COMPANY, INC.
330 West 42nd Street, New York, N. Y.

Send me Younger, Bonnalie and Ward—Airplane Maintenance for 10 days' examination, on approval. In 10 days I agree to pay $3.00 plus few cents postage and delivery, or return book postpaid. (We pay postage on orders accompanied by remittance.)

Name .....

Address .....

City and State .....

Position .....

Company AV.1-39

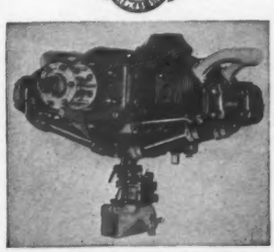
(Books sent on approval in U. S. and Canada only.)

Hail the Champion!

• • PROVED AGAIN

Speed • Safety • Stamina • Economy

UNEQUALED IN THE LOW PRICE FIELD



Coast to Coast Aeronca

Powered with the brilliant *Continental* A-50 ENGINE

Coast to coast—non-stop, non-refueling — another world record for Aeronca. Piloted by Johnny Jones, powered with a Continental A-50 motor, the sensational Aeronca Chief with a fuel load of 900 lbs., crossed the continent in one hop in 30 hours 37 minutes at a cost of less than 1¢ a mile. Sensational performance — Speed to go places — Safety that's tops — Stamina to take it — Economy that's amazing. Here, again, is proof of Aeronca's outstanding leadership — the ship you'll surely choose to fly and own. See your Aeronca dealer today for free flight demonstration, or write for descriptive information.

Only $565 down—The famous Aeronca Chief 50 delivers for as little as $1695, F.A.F. Cincinnati. Easy time payment plan.

AERONAUTICAL CORPORATION OF AMERICA

H-1 Lunken Airport — Cincinnati, O.

Congratulations

JOHNNY JONES

Your sensational solo flight coast to coast in the Aeronca Chief 50 powered by Continental marks another milestone in aviation progress. We are proud that you as President of Jones & Humeston, Inc., Metropolitan Airport, Van Nuys, California, represent Aeronca as West Coast distributors. Aeronca dealers, everywhere, join our salute to you.

Flight Facts

Takeoff	Los Angeles, 6:31 A.M. Nov. 29
Landing	New York, 4:17 P.M. Nov. 30
Length of flight	2785 miles
Elapsed time	30 Hr. 37 Min.
Average speed	91 M.P.H.
Average altitude	5000 Ft.
Fuel carried	146 Gals.
Fuel used	121 Gals.

Proven Champion of the Low Price Field

AERONCA

AERONCA Chief 50

Celebrating Aeronca's coast to-coast flight with Johnny Jones up. 2785 miles non stop, non-refueling.

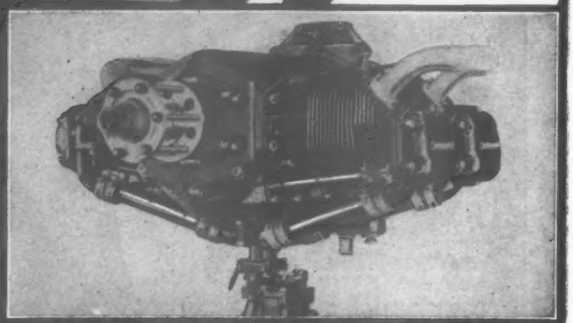
UNDERLYING FACTORS OF SUCCESS

It's great to be identified with events like this record breaking Aeronca flight. All credit, first, to Aeronca Management and Engineering. ¶ Continental's reputation for building dependable power comes from years of insisting upon the very best of materials and workmanship. The selection of Atlas Drop Forged crankshaft and connecting rods was, may we modestly suggest, a "natural."

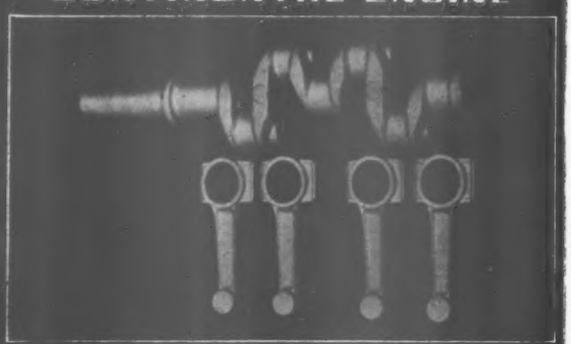
ATLAS DROP FORGE CO. LANSING, MICH.

ATLAS DROP FORGINGS

All shapes and sizes to 500 lbs.



CONTINENTAL ENGINE



ATLAS DROP FORGINGS

THE AVIATION NEWS

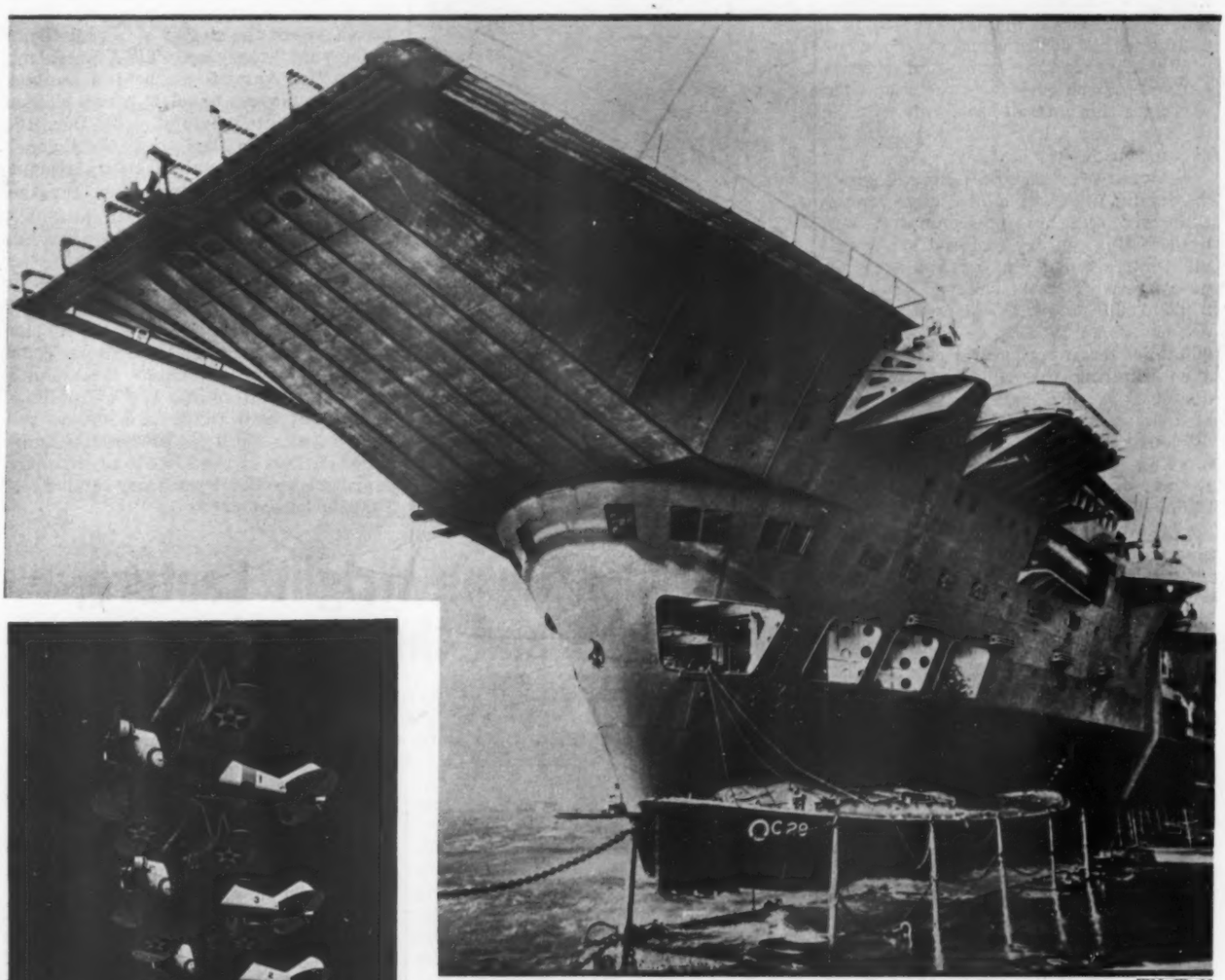
REVIEW, COMMENT, FORECAST

DANIEL SAYRE
C. F. McReynolds, *Pacific Coast*
Blaine Stubblefield, *Washington*
E. R. Lockin, *New York*

JANUARY 1939

Industry Waits for Arms Program

(Story on Page 49)



Wide World

ENGLAND'S NAVY: A quayside view of Britain's latest aircraft carrier H.M.S. Ark Royal. The vessel, which took three years to build, will shortly be commissioned for service with the fleet. Last month Germany launched a first carrier. (Story on page 65.) Russia announced she, too, was in the race for sea-born air strength.

KANSAS' NAVY: The First Aviation Division Squadron VS-12R does some formation flying over its mid-western base. Known as the TWA squadron because all its pilots and much of its ground personnel are TWA employees, VS-12R has won the Noel Davis Trophy for efficiency three years in a row.

Lines Break Safety Marks

Loss of plane off California Coast still leaves July-Dec. record best in history

AS EVERYONE within reach of the daily press or the radio knows, there was an airline accident Nov. 29 in which three passengers and two crew members met death after a United Air Lines DC-3 landed in the surf off Point Reyes, California. Until the C.A.A. Safety Board issues its official findings (and it evidently doesn't make up its mind any faster than the old B.A.C.—Ed.), there seems to be nothing to add to Pilot Charles Stead's explanation that some electro-magnetic condition caused distant radio stations to jam out the Oakland beam which would have led him safely to his destination.

What we can do—with our fingers crossed for the period between the time we write this and the midnight clamor of New Year's Eve—is talk about an astounding safety record:

Between May 25 and Nov. 29, (that is, during a period a few days longer than six months) the domestic airlines of this country suffered but a single fatal accident; killed but a single passenger. That's a record of about 275,000,000 revenue passenger-miles per passenger fatality or about 40,000,000 miles flown per fatal accident. Now, even counting the November 29 accident, the record for the second half of 1938, unless someone plows one under during the last days of December, is going to be something to shout over. By our estimates, it will be at least 70,000,000 passenger-miles per passenger fatality, or about 20,000,000 airplane miles per fatal accident.

For the first half of 1938, comparable domestic figures are 11,958,980 passenger-miles per passenger fatality and 11,047,430 plane miles per fatal accident.

Navy Man To Head U. S. Weather Bureau

THE PRESIDENT 'did something' about the weather last month—he reached into the Aerology station of the Navy's Bureau of Aeronautics for studious, fortyish Lieut. Comdr. Francis Reichelderfer and appointed him Acting Chief of the U. S. Weather Bureau.

The appointment should produce loud cheers in aeronautical circles. Comdr. Reichelderfer helped organize the Navy's meteorological services after the War. He has had long and intimate contact with the Navy's flying operations both lighter-than and heavier-than-air. Most importantly, he is reputed to be one of the country's earliest and most progressive exponents of the Air Mass Theory. In other words, he sounds like just what the Doctor would order for the Weather Bureau—a good shot in the arm.

TWA Shelves Lindbergh Slogan

COL. AND MRS. LINDBERGH
Will live in Paris

THE ASTOUNDING LEGEND of Charles August Lindbergh grew fatter by one more chapter last month. The particular headlines involved were: (1) Dec. 5, reports came from Kansas City that TWA was dropping the slogan "The Lindbergh Line" from its advertising, its time tables, its 1939 calendars. "It is known" said the Kansas City Star, "that the reason for dropping the Lindbergh identity is mounting complaints against the heroic Atlantic flyer of 1927 because of his decision to live in Germany." TWA officials, that day, had "no comment." (2) Next day, however, Jack Frye explained the slogan's deletion as a "routine change". "We have dropped the slogan . . . at times in the past," the young TWA president said. "In August we held a contest among employees to select a new slogan stressing winter flying." (3) Dec. 12, word came from Paris that the Colonel and his wife had taken an apartment there and were settling down for the winter.

Reports on Airports

OF THE 191 REGULAR AIR LINE STOPS in the United States, the WPA has improved 169, or more than 88 per cent, according to a statement last month by Harry L. Hopkins, WPA Administrator. Federal funds laid out on the 169 projects total $66,000,000. Additional outlays of the same kind, recently approved by the President, total $16,000,000, he said.

Dr. Dryden Gives Wright Lecture, Turbulence and the Boundary Layer

DR. HUGH L. DRYDEN of the U. S. Bureau of Standards delivered the second Wright Brothers Lecture in New York on Dec. 17 to an audience which filled one of Columbia University's big lecture halls to overflowing. Simultaneously, some 25 branches of the Institute of Aeronautical Sciences heard readings of his paper in other cities.

Dr. Dryden began his lecture with an historical summary of the experiments in which effects due to differences in turbulence in various wind tunnels were first noted. He described methods by which wind tunnel turbulence was investigated and finally calibrated. He then passed to the subject of turbulence and other phenomena in boundary layers.

Dr. Dryden described measurements by himself and others in both "laminar" and "turbulent" boundary layers. The laminar boundary layer prevails near the forward edge of an airplane wing or any other smooth body and is characterized by smooth flow and low friction at the surface. The turbulent boundary layer sets in further back on the wing and leads to higher values of resistance or friction. One of the most important current aeronautical problems has to do with the region in which the boundary layer changes from laminar to turbulent.

The lecture closed on a "Note of Interrogation" in which Dr. Dryden gave what in his opinion are the most important problems connected with the further investigation of boundary layers. More detailed studies of the region in which the boundary layer changes from laminar to turbulent under various conditions of curvature of the surface, pressure differences, etc., were urged.

Dr. Dryden concluded with the sentence: "The answer lies in further following in the footsteps of the Wright brothers—more experiment, by scientists and engineers, in flight and in wind tunnels."

Industry Waits For Details To Emerge On Arms Program

THERE IS ONE STRONG IMPRESSION of 1938 the aeronautical industry is bound to carry with it down through the years, it's that of Waiting on Word from Washington. Do you remember waiting to find out what the Administration wanted in the way of civil aviation control; waiting to find out what Congress would do about it; waiting to find out who would be on the new Authority? In fact we're still waiting for the C.A.A.'s decisions on a score of fundamental questions of policy. And now we've started on a new set of waits: waiting to find out just how many planes the President will ask of Congress; then waiting to find out what Congress will do about it, and so on.

To make it even more trying on impatient young men anxious to pile into a job of definite work, few things transpired last month that helped one even to guess how the Defense Program will eventually shape up.

Talk continued of a combined air strength for the Army and Navy of 12,000 planes. Talk continued (in the vaguest of terms) of widespread educational and training programs. Talk began and became quite general that the Administration would attempt to build up to the 12,000 plane figure within two years.

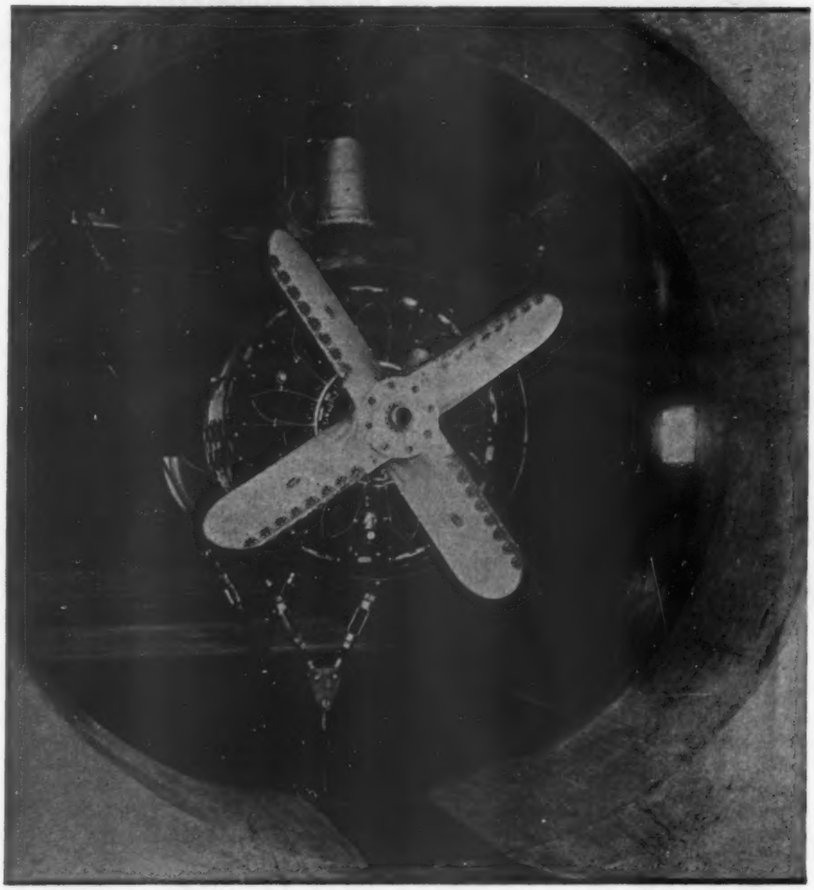
Early in December, representatives of most of the country's military plane manufacturers were called to Washington for conferences. Afterward the Assistant Secretary of War, Louis Johnson, stated the manufacturers had assured him of complete cooperation.

Meanwhile, political commentators, who had hailed a Defense Program as an almost sure-fire Administrative bid for public and Congressional support, began predicting obstacles. Individual congressmen, suspecting what they called another "blank check" spending program, promised they would give any presidential suggestions "the closest scrutiny". Much would depend, the observers felt, upon tax plans and revisions that might be attached to the defense proposals. The whole program might emerge from Congress considerably cut down in dimensions. But no one was sure we'd have to wait.

Flash

AFTER EXTENSIVE REHEARINGS, requested by the Aeronautical Chamber of Commerce, the Public Contracts Division of the Department of Labor has revised its order of June 24 by which the minimum wage rate in airplane factories working on government business would have been fixed at 60 cents an hour. Instead this wage minimum has been fixed at 50 cents an hour except for apprentices who may be employed at lower rates. Manufacturers of lightplanes, instruments, accessories, radios and parachutes are not effected by the ruling.

STRIKING COINCIDENCE DEPT.



YOU FIGURE IT OUT: Last Month Curtiss-Wright announced it was building 14 new engine cells for production-testing of engines "up to 3,000 hp." Then Hamilton Standard sent in a picture of a 17-ft. prop. No one "was in a position" to give details. It couldn't be that one or more American engine builders have finished an 18-cylinder, 2,000 hp. engine—or could it?

AVIATION IN WASHINGTON

by BLAINE STUBBLEFIELD

You can get lots of answers on "The Program"

Western-Hemisphere defense is the current theme song of Washington and aircraft is the keynote. The War Department has a lot of pretty scary information on Hitler's and Mussolini's air power and how they used it to win the Munich decision. Confidential figures on the comparative air fleets of the dictators and the democracies are extremely disquieting (As Paul Johnston found out in Europe and reports elsewhere in this issue—Ed.). Washington doesn't at all relish the way foreign trade clutches are being sunk into the Hispanic countries. So American aircraft plants will be put into production up to their necks if the War Department has its way. But Congress will have the last word. What will it be?

Try to find out! If you come here as a super-charged industrialist or a gentleman journalist you can twist brass door knobs and spring some off-the-record interviews. If you go to a given Department first you will come out in a mood to call up your broker and order him to buy everything that flies, from aluminum to soy beans. But wait till you are ushered in to the big chief at the next wickiup on your calling list.

"Aviation promotion shouldn't be tied to WAR," says he. "Suppose we try to ride this swell of agitation for rearmament, and it flattens out. It is unthinkable that we shouldn't support the Army and the Navy in whatever Congress wants done, and we will. But meanwhile we want aviation to go ahead on its own as an industry and as an arm of commerce." It's plain the civil air people don't want an air bonanza that will peter out and leave them with coyotes howling through empty hangars.

Opposition to an arms race will run strong from pacifist, isolationist, and anti-tax elements as usual. Conservative Service factions see jealous-green every time aviation raises its arrogant head above the muddy trenches, the dusty caissons and the iron sea horses. And they are bitter at sight of politicians taking over the controls. Nevertheless, the President happens to be the Commander-in-Chief, and the Army and Navy boys will turn on their full head of steam when they are called to Capitol Hill to testify.

And Congress will yield, is the preponderent opinion. What will be the score? It will be authorization and appropriations for from one-half to nearly all the armament money the President asks. If the dictators continue to take turns needling the democracies to the brink of war and kibbitzing in on our trade preserves down South, the US will go into a preparedness lather.

Rough sketch of the Air Program: (1) Airplane production *capacity* is the main thing; that stuff about darkening the sky with wings is bad-man talk; but even the planes-on-hand objective will be at least as impressive as the newspapers say, perhaps more so. (2) Skilled labor shortage will be met by turning more juice into CCC and the vocational education program. (3) Multitudes of pilots will be pulled through the colleges and the Youth organizations. (4) The Government may set up some shadow plants but will not horn in on manufacturing except as a last resort. (5) More air speed will be the chief technological objective. (6) Air transport will not be allowed to suffer anemia; private flying will be propped up and given a shot of high-life. Through it all the appearance of militarizing the country will be avoided like the plague.

Private Flying "Division" is an expansion of the C.A.A.'s old Private Flying Section and is another move to put smelling salts to the nose of non-scheduled flying. Only those who know Mr. Noble can appreciate how seriously he is concerned about this country's being so far behind in the production of citizen flyers. He is working hard on plans to make more training available through present air schools and through colleges. It's a tough job. First he, and others interested, will have to sell Congress. If he succeeds in that, and solos a big block of American youth, then he will have to find something for them to fly after graduation day. He says mass production and mass use will do the trick, and he's looking for a pinch-bar big enough to start it rolling.

Capitalisms: Senator Pat McCarran is reported at work again on plans to set up a civil aviation committee in the Senate . . . CAA could subsidize feeder lines by granting high mail rates in the public interest, but it probably won't. . . . As this is written nearly all carriers have petitioned CAA for air mail rate hearings; most show operating losses and all want a raise. . . . Flat-topped buildings will be the style if Mr. Farley's Postoffice-roof-to-airport giro service in Philadelphia pans out. And ten years from now the cities will want Washington to subsidize more and bigger roofs.

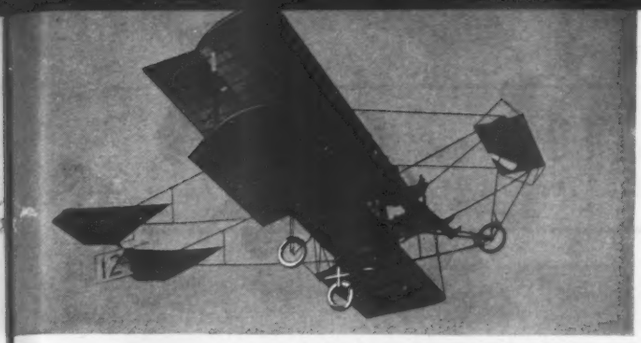
Transport business is too good to suit some operators who were hoping red figures would bring tears to the eyes and higher mail rates to the minds of CAA. Autumn revenues are adding up to new highs for the period, and are good enough in some cases to make the difference between profit and loss for the year. This prosperity seems due to better general business conditions, to Air Travel Week, and to the mere reassuring existence of CAA. If it keeps up, it's bound to be considered in rate fixing.

Reunion at The National Airport, in a new building designed for the purpose, is the happy outlook of CAA, which is now scattered over town in half a dozen places. Estimated cost of the building is $1,000,000. There on the artificial banks of the murky Potomac, if American air transport stays ahead of other nations, will be world headquarters for the art of commercial flying.

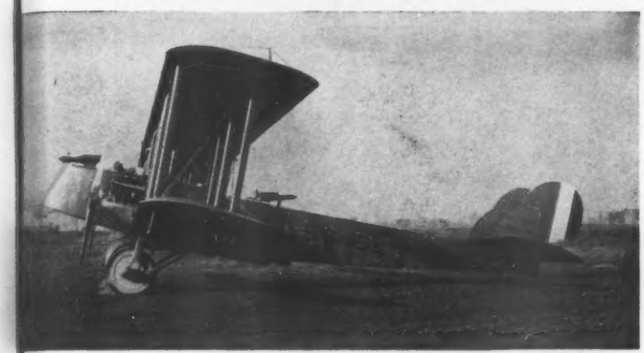
Grandpaw Certificates of CN should be issued around the last of January, pretty much in a flock but not all on the same day. Examiners are completing their reports as this is written; most will be in by the first of the year. These go direct to the Authority, which will write its own decisions and opinions, and will attach its terms, limitations and conditions for each, in accordance with the law. Operators have to prove they were giving efficient service between certain points on a certain date. It sounds as easy to get as a birth certificate, but not so. The principle dispute is on an old point: Can an operator fly direct between any two of its termini? Washington opinion says No. If they could, United, for instance, could fly three of the transcontinental routes as express runs.

CAA's estimate for next years appropriation has been seriously cut by the Budget Bureau. The estimate is supposed to have been between thirty and thirty-five million. The cut is no surprise. Though Congress has doubled federal obligations to civil aviation, the Bureau evidently is not thinking that way. Of course the figures can be jacked up by friends in Congress, probably an effort to that end will be made.

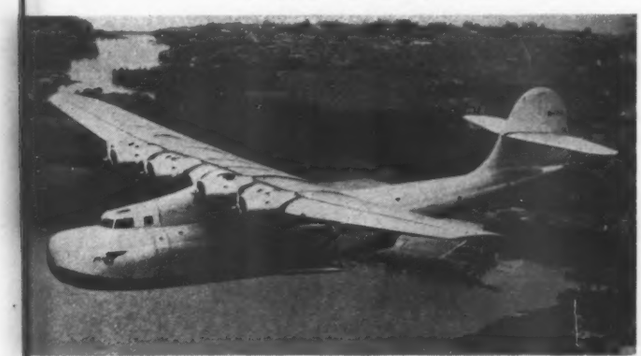
Grant Mason's Report on Europe is the last word about civil aviation in that unhappy land. Mason and his partner in the survey, Dennis Mulligan, found Europe getting a-way ahead of us through programs of government-sponsored club flying (which is not news) and ahead of us also in several points of finesse in air transport (which is). Their observations covered England, Ireland, Holland, Germany, Czechoslovakia, Italy, France, and other places. The prime effect, as viewed from here, will be to turn the steam on Congress about aid for citizen aviators.



1909 Glenn L. Martin in one of his first airplanes which he built and flew nearly thirty years ago. Frail, crude, ungainly—yet this was the successful pioneer of a distinguished lineage.



1918 Martin produces the first twin-engined Bomber built in America—for 8 years the standard of the U. S. Army, and first in a long line of famous Martin military aircraft.



1935 The world marvels as Martin-built "China Clippers" inaugurate scheduled flights across the vast Pacific.

1937 The great, new Ocean Transport which eclipsed the Clippers. Larger, faster, magnificent in proportion, colossal in size, sensational in performance!

1938 Martin 166 Bomber Airplane which has set new standards for military aircraft throughout the world. Available for export

Past Achievement Future Accomplishment

Like JANUS, Roman god of all beginnings, we enter 1939 by reviewing the past, seeking in what has gone before, a spur to greater accomplishment in the New Year.

THE GLENN L.

MARTIN

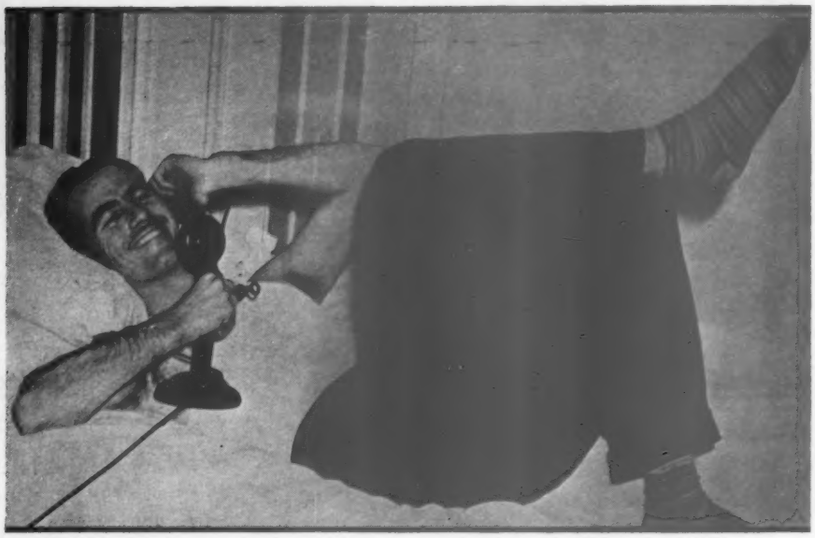
COMPANY

BALTIMORE, MARYLAND, U. S. A.

Builders of Dependable TRADE MARK *Aircraft Since 1909*

AVIATION PEOPLE

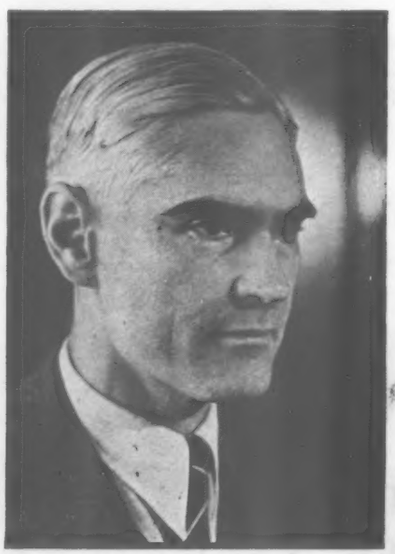
Who's Who in This Month's News



FLYING DUTCHMAN: K. D. Parmentier, KLM pilot and one of the best known fliers in Europe, sits at the controls of the DC-4. (KLM is reported strongly interested.) Parmentier is the pilot who pushed a DC-2 to a glorious second place in the MacRobertson Race to Australia.

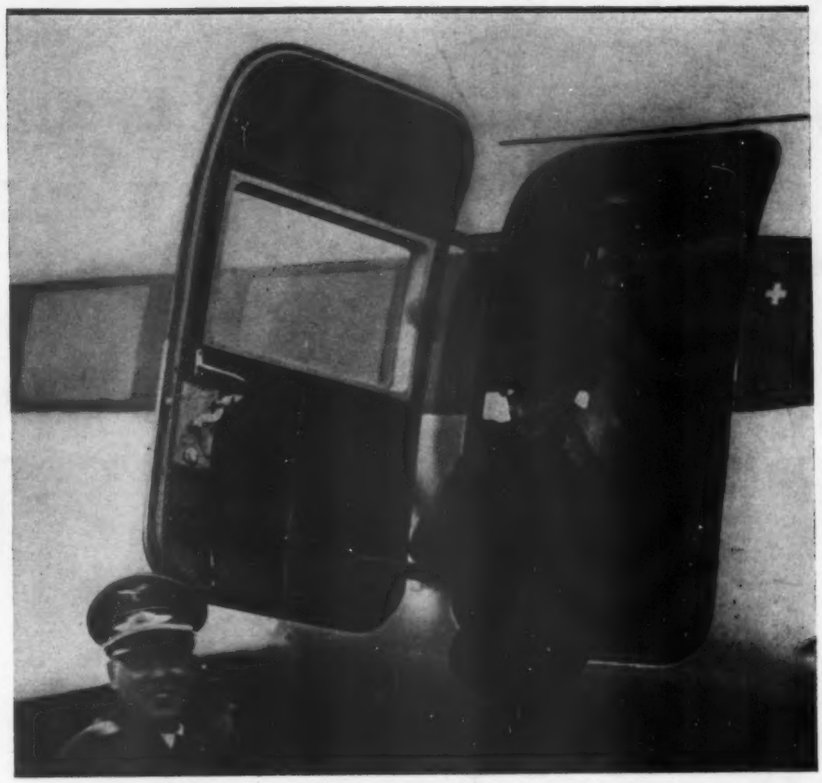
FLYING HOOFER: Johnny Jones takes it easy in a New York Hotel after his brilliant non-stop crossing of the continent in an Aeronca. Once a vaudeville tap dancer, Jones is now an energetic (very) lightplane salesman in Southern California. (Story on page 67.)

MEN OF PARTS: Left—Comdr. G. O. Noville has been with Byrd to both Poles. He helped organize the first air mail lines; has held executive positions with Socony Vacuum and Standard of California. He helped start Inter-Island Airways. Above—E. J. Rivers has been a plant executive for General Aviation, Stinson, and North American. Now both are vice-presidents of the new Continental Aeronautic corp. (Story on page 56.)



BOSS OF THE HIVE: J. Carlton Ward, Jr. has been elected Vice-President and General Manager of Pratt & Whitney, suceeding C. W. Deeds, resigned. Ward has served with the parent Pratt & Whitney tool company; was Vice-President for Hartford Machine Screw Co., later joined the General Cable Company to direct fourteen factory units. He joined Pratt & Whitney as Assistant General Manager in 1935. (Story on page 59.)

FLYING PRIEST: Father Paul Schulte, known all over the Canadian Arctic for his air-born feats of mercy, stands besides his "Chapel of the Air" which is being reconditioned in St. Louis.



BERLIN FAREWELL: Flugzeugfuhrer Hauptmann Rudolf von Moreau and Flugkapitan Alfred Henke crouch in the doorway of their four-engined Folke-Wulf Condor and wave goodbye to friends at Tempelhof. That was on the afternoon of Nov. 28. Forty-six hours later they landed their big ship at Tokio some 8,500 miles away after stopping thrice for refuelling. Dec. 6, at the end of their first homeward leg, the Condor had engine trouble just before landing at Manila, came down in the Bay and was wrecked—a sad end to so brilliant a flight. Capt. Henke is, of course, the same pilot who made round trip crossings between Berlin and New York last summer.

FIRST LADY OF THE AIR: Mrs. Roosevelt returns to Washington from the West Coast by air—as usual.

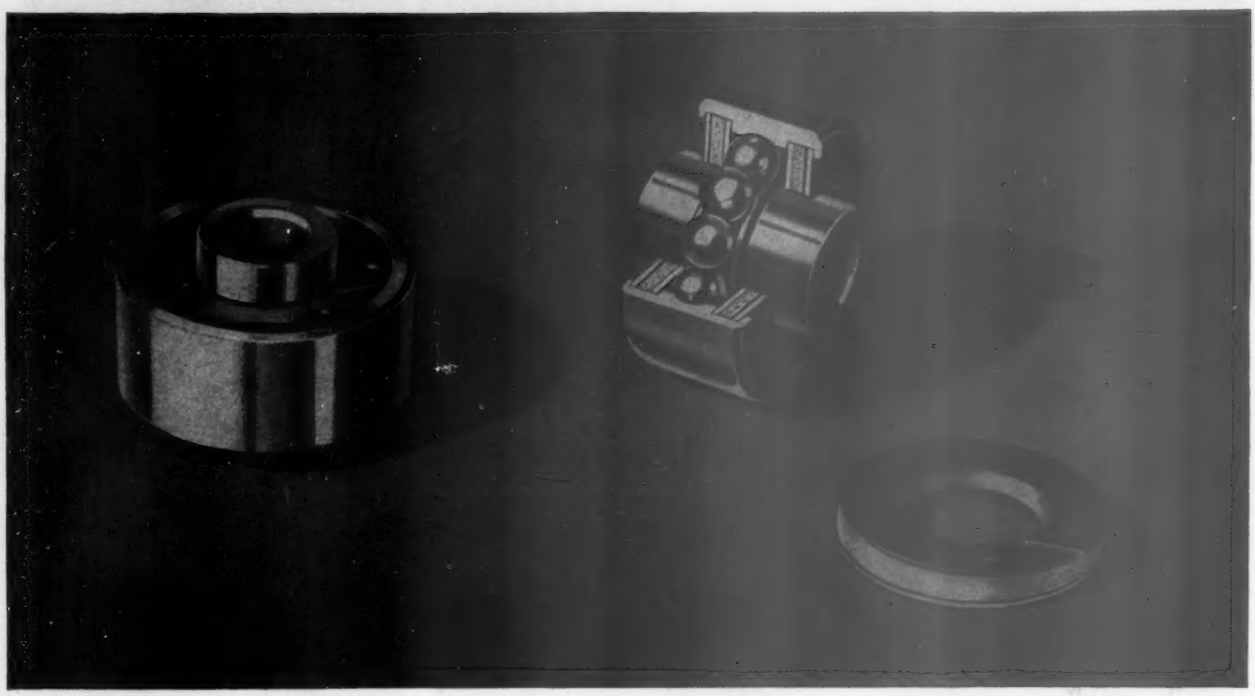
TOP - FLIGHT BUILDER: Leroy Grumman looks pleased at reports on the past year and at prospects for the next. His Beth Page plant is humming on Army and Navy orders. The Grumman twin-engined amphibian is drawing purchasers from all over the world.

RADIO AIRMAN: Sydney Nesbitt has been appointed Sales Manager for Lear Developments, Inc. A radio operator and constructor, Nesbitt has been a licensed pilot since 1926. He will be at Miami to demonstrate Lear's new automatic compass.

REMOVABLE, REPLACEABLE FELT SEALS

AS *Pioneered* BY NORMA-HOFFMANN FOR *Aircraft* CONTROLS

ARE ECONOMICAL AND EASY TO INSPECT AND REGREASE



While these seals are FIXED against accidental displacement, they are REMOVABLE and REPLACEABLE at will, easily and quickly. They facilitate regreasing and inspection. No snap rings are used. This seal, together with cadmium plating of exposed surfaces, gives NORMA-HOFFMANN AIRCRAFT CONTROL BEARINGS complete protection against the elements and foreign matter. * * * * They are available in a number of series, both single and double row types—all combining extreme sensitiveness with utmost rigidity, and eliminating frictional resistance, "jamming", and wear.

Like many other fundamental aircraft types, these Removable Felt Seal Control Bearings were originated by NORMA-HOFFMANN, and are extensively used in U.S. Navy and commercial aircraft.

Write for the Catalog. Let our engineers work with you.

"NORMA-HOFFMANN"

PRECISION BEARINGS

BALL ROLLER THRUST

NORMA-HOFFMANN BEARINGS CORPN., STAMFORD, CONN. U.S.A.

Ryan To Boost Capital

WITH ITS BACKLOG of orders at an all-time high of approximately $375,000, Ryan Aeronautical in December announced plans for issuance to stockholders of rights to subscribe to additional shares of the $1 par value stock, in the ratio of one share for each four shares currently held, and at a price to be announced. T. Claude Ryan stated that the company seeks authority to increase capital stock to 500,000 shares from the present 300,000, all of which are outstanding. Under the proposed issuance of rights an additional 75,000 shares will be offered. Proceeds from sale of such stock will be used for factory expansions, additional equipment, and working capital. Although the company is well ahead of current schedules on deliveries, Ryan stated that production should be increased in anticipation of further orders from foreign governments for the STM type military trainer, and also in view of prospective business from aircraft manufacturers who have sub-contracted to Ryan the manufacture of exhaust manifolds and other items. Ryan recently completed 641 seats for Navy bombers and is working on 432 cabin seats for Army Air Corps transports. Exhaust manifolds are being delivered at the rate of 26 assemblies per week.

Purchases Johnson Assets

AIR TRANSPORT EQUIPMENT OF GARDEN CITY, N. Y., has purchased the assets of Johnson Airplane Supply Co. of Dayton, O. A quarter of a million bolts and miscellaneous aircraft hardware were brought east to Roosevelt Field, Long Island, N. Y.

Brewster Enters New Plant

BREWSTER AERONAUTICAL CORP. has begun moving into its new plant, situated on a square block (with an adjoining parcel) in Long Island City, N. Y. President James Work announces that the compactness, adaptability and convenience of the new plant promise to effect many manufacturing and operating economies. Its location, adjacent to the Long Island Railroad and near all subways and two elevated lines, will be important to customers and to the 800 to 1,000 employees who are expected to be at work in the new plant by early in 1939. The entire plant, by virtue of design, materials, and location, is very adaptable to expansion.

Vultees Go To Brazil

HAVING RECENTLY COMPLETED DELIVERY of 40 type VII-GBT attack bombers to Turkey, Vultee Aircraft is now engaged in delivery of 26 VII-GB2 attack bombers to Brazil. Twenty of the Brazilian planes have already been shipped, and the balance will be delivered early in 1939.

DOUGLAS PRODUCTION: Experts put it at 100–150 per month, without expansion.

Douglas Takes Labor Fight To Courts Issues Statement After NLRB Ruling

Declaring his firm will appeal the Labor Board's decision to the courts "where the law and Constitution still prevail" Donald W. Douglas, president of the Douglas Aircraft Co., issued a sizzling statement in reply to the board's order of Dec. 8 to reinstate 32 sit-down strikers with back pay. The full statement is as follows:

"One more absurd ruling by the National Labor Relations Board will surprise no one. By this time everybody in the United States, except the board members, knows the board has been steering a reckless course up a blind alley.

"In the Douglas case, its decisions have been travesties on justice and a challenge to reason. Created to insure peace and friendly relations in industry, the board somehow managed to accomplish just the opposite.

"Surely this is not the time, nor are aircraft factories the place in which planned violence and destructive strikes should be permitted. Anything that justifies lawlessness and upholds men convicted of conspiracy is a blow at our national defense.

"Patriotic Americans need only look at other nations where sit-down strikes originated and subsequently destroyed national efficiency and production, to realize the folly and danger of protecting and pampering potential wreckers and trouble makers.

"Another sad thing about this situation is that for nearly two years the board has been denying our employes the right of collective bargaining—rights which we freely recognize and would like to grant.

"Why doesn't the board hold an election at our main plant to determine who should represent the men as provided by law? Is it because it knows its pet union is in a hopeless minority or is it because the board thinks labor has no mind or will of its own and must select a union of the board's choosing or none at all?

"Not only 5500 of our employes but the nation at large would like a frank answer. The board's order will be appealed to higher courts where the law and the Constitution still prevail."

Martin Asks More Stock

GLENN L. MARTIN CO. has asked approval of the S.E.C. of the sale of 156,000 shares of authorized but unissued common stock to shareholders. Rights to the stock will be sold at $20 each (below market cost) on the basis of one share for each six held. Glenn L. Martin said that shareholders have not yet received any part of the company's earnings as dividends, due to the fact that these earnings were needed for expansion. It is expected that part of the new funds will be used to defray some of the cost of construction of a new airfield.

P&W Pays Bonus

EXTRA COMPENSATION of a week's pay will be distributed to about 2,000 employees of Pratt & Whitney. All employees on the payroll on Dec. 1 will be eligible for the distribution.

Sub-Contractors Bloom in L. A.

Continental Motors announces new $560,000 company.

ONE OF THE MOST SIGNIFICANT recent developments within the aviation industry in Southern California has been the rise of sub-contractors and specialty manufacturers to a position of major importance. One sub-contractor recently reported that, in bidding for an item of aircraft business, he found himself competing against 48 other firms, all of them located in Southern California. This situation has been caused by two factors: (1) Rapid increases in business contracted for by the big aircraft builders (such as Douglas, Lockheed, North American, Consolidated and Vultee) has taxed their plant facilities. Rather than undergo major factory expansions, it has been felt wise to sub-contract certain types of work, notably machine work. (1) Certain new developments, as in the field of hydraulic operating mechanisms, have given rise to a considerable number of specialty manufacturers of parts or equipment.

In some cases peak production has been efficiently averaged out by one aircraft manufacturer sub-contracting work to another. Thus the Ryan Aeronautical Company, of San Diego, aircraft builders; and the Menasco Manufacturing Company, of Los Angeles, aircraft engine builders, have each done a very great deal of work for such firms as Consolidated, Lockheed, Douglas, and others. Menasco has specialized in machine work, Ryan in drop hammer stampings.

A pioneer in the field of sub-contractors has been the Solar Aircraft Company, San Diego, which specializes in the production of exhaust manifolds, heaters, and other parts largely of stainless steel. Examples of the firms built up through acceptance of their own patented or specialty products are the Librascope Development Co., and the Aircraft Accessories Corp. Librascope has successfully developed a new device for controlling loading of aircraft, while Aircraft Accessories Corp. holds a number of patents on units of aircraft hydraulic equipment. In a report to his board of directors summarizing the position of the company at the beginning of its second year, Ted Lynn, president of Aircraft Accessories Corporation, stated that first year sales totalled $119,632.56, and that current backlog exceeds $123,000.

Interstate Aircraft and Engineering Corp., located in Inglewood, was originally developed and operated for more than a year solely on machining contracts for the Douglas Company. This firm has since expanded the scope of its operations. A similar development occurred in the case of the Herberts Machinery Company, originally marketers of production machinery to the Douglas Company. Because of its extensive machine equipment operated in the repair and maintenance of fine machine tools the Herberts firm undertook extensive precision machine work for Douglas. Eventually this work became so important that a new company was formed to handle it. First known as the Herberts Engineering Corp., then as Aircraft Components, Inc., the enterprise has finally been incorporated under the name Aircraft Precision Products, Inc. Management includes C. A. Herberts, pres., Robert A. Lawson, chief engineer, and Earl H. Howard. Prominent on the board of directors are officials of Consolidated Douglas, Lockheed and Vultee.

Last month announcement was made of the formation of an entirely new $500,000 corporation, the Continental Aeronautic Corp., sponsored by Continental Motors Corp., of Detroit. W. R. Angell, president of Continental Motors Corp., has announced that factory buildings on a 23½ acre site have been leased in Burbank. Manufacturing operations, to commence about January 1st, will be devoted to the manufacture of special parts such as wing spars, tips, and control surfaces. Officers will include E. J. Rivers, formerly of North American Aviation, Inc., vice president in charge of production; Lieut. Commander George O. Noville, of Byrd Arctic and Antarctic expeditions, vice president in charge of sales; W. R. Angell, Jr., son of the president of Continental Motors Corp., vice president, and R. M. Allan, secretary-treasurer. Initial investment is reported at $560,000.

Lockheed Nears One-A-Day

LOCKHEAD sales reported during December have been sufficient to send the Lockheed Aircraft Corporation into 1939 with a record backlog of approximately $30,000,000. Employment is currently at 2700 persons; production at the rate of twenty twin-engined transports or bombers per month. Recent plant expansions included a $95,000 second story annex to house the engineering division, and a $140,000 assembly hangar (completed during December) which adds 40,800 square feet of floor space. Current production models include the Lockheed Electra, 12, 14 and the B-14 which is the militarized version. In prospect are the 212, a military version of the Model 12, and the 27. The new Model 27 is a very hush-hush project and no official information is out on it. Best current guess is that it will be a transport designed for the same general field as the Douglas DC-4, Boeing 307, Curtiss-Wright 20. Recent Lockheed orders include a Model 12 for the NACA, four Model 14s for Polish Air Lines, and two Electras for Saco Airways, Colombia.

North American Hits Stride; 3,200 Workers Build 2 Per Day

WITH ITS PRODUCTION SCHEDULE geared to two planes daily, North American Aviation continues to topple America's peacetime aircraft production records. Deliveries for three months ending Dec. 31 were expected to approach $4,000,000, lifting total 1938 sales to approximately $10,000,000. This compares with total sales of $3,469,735 for 1937. The best previous quarterly sales record was $3,400,000 for the three months ending Sept. 30, 1938. Deliveries on the 200 plane British order are being made at the rate of 15 per month and 20 planes had already been delivered by early December. In spite of the current high delivery rate, the company's backlog is around $15,000,000 as a result of substantial new orders. North American recently completed delivery of 180 basic combat planes for the Air Corps and has delivered 94 of an order for 174 observation planes. The Inglewood factory, estimated to have a productive capacity of 10 planes daily, is now working with 3000 employees on the day shift, and 200 on the night shift. Estimated net profits for 1938 are $1,700,000, or approximately 50c. a share on 3,435,033 shares outstanding.

Exports Up 8 Per Cent

THE BUREAU OF FOREIGN & DOMESTIC COMMERCE reports that the exports of aeronautic products during October amounted to $4,948,153, as compared with $3,662,559 in October, 1937. Total exports for the first ten months of the year reached $58,283,328, an increase of 88 per cent over the same period last year. Aircraft represented the largest item, amounting to $33,396,171, or 57 per cent of the total. Parts and accessories followed with $18,425,730, or 31 per cent, and engines totalled $6,244,867, or 11 per cent.

Glenn L. Martin Honored

BOTH his home city and home state have recently honored Glenn L. Martin. Governor-elect Herbert R. O'Conor of Maryland has appointed him to a nonpartisan citizens' committee of nine members which is to make a survey of state departments and institutions, and recommend steps for reorganization and more economical and efficient operation. The group serves without pay and includes Dr. Issaiah Bowman, president of Johns Hopkins University, and Dean G. Acheson, former Assistant Treasurer of the U. S. Treasury. The city of Baltimore has selected Mr. Martin as the business man whose outstanding business achievements during 1937 contributed most to the progress and reputation of the city, and presented him with a medallion. The citation

(Turn to page 59)

1939

AMERICA PREPARES FOR

PEACE

EST. 1923

CONSOLIDATED AIRCRAFT CORP.

SAN DIEGO CALIFORNIA

ENGINES WITH A STOUT HEART
WORLD WIDE ACCEPTANCE
ENGLAND
LINDBERGH
6917 McKINLEY AVE. LOS ANGELES, CALIF.

(*Continued from page 56*)

mentioned the Martin Company's $2,500,000 plant expansion program, the building of the Model 156, and the company's cooperation with the civil vocational authorities, making possible a pioneer program in vocational training (see AVIATION, Nov. 193, p. 59).

Ward To Succeed Deeds

United Aircraft announces promotions.

THE ELECTION of J. Carlton Ward Jr. as vice president and director of United Aircraft Corporation, and his appointment as general manager of the Pratt & Whitney Aircraft Division, was announced by Donald L. Brown, president of the corporation. He succeeds C. W. Deeds, who resigned to become president of the Chandler-Evans Corporation. At the same time Mr. Brown announced that H. Mansfield Horner has been appointed assistant General Manager of Pratt & Whitney.

Mr. Horner, who succeeds Mr. Ward as assistant general manager, joining Pratt & Whitney in 1926, immediately after graduating from college, he worked successively in the assembly, test, inspection and purchasing departments, becoming assistant sales manager in 1936. He has also served as assistant secretary of United Aircraft Corporation, which position he retains in addition to his new duties.

P. A. Syndicate Broadens Out

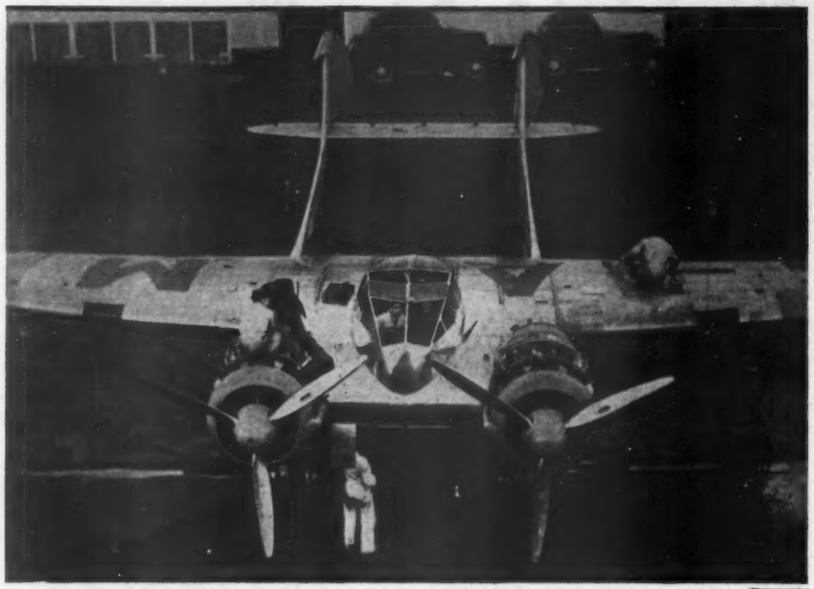
ARRANGEMENTS completed in Washington mark the further activities of Pennsylvania Aircraft Syndicate of Philadelphia in the light metal field. In addition to their beryllium interests, they now control the Buzzard Anodic treatments for aluminum, magnesium and their alloys. The present engineering department will be enlarged to render complete installation and maintenance service.

Dr. Watter to Budd

DR. MICHAEL WATTER has joined the Edward G. Budd Manufacturing Co. as chief engineer of the aircraft division.

Howard Set to Push Sales

HOWARD AIRCRAFT of Chicago, encouraged by a steady interest in its high-performance cabin planes is clearing decks for a big sales offensive during 1939. Sparkplug of the drive will be newly-appointed General Manager, B. D. De Weese, to whom the industry needs no introduction. After some years in the automobile field, he joined Stinson in 1930, was General Manager until 1934, then served as President until last year.



European

BRITAIN'S BURNELLI—Here's the latest of the line, built in England and about ready to be flight tested there by Clyde Pangborn. Estimated top speed, 235 m.p.h.; range, 2,000 mi. Cabin takes 15 passengers.

PROFITS AND LOSSES

» AERO SUPPLY MANUFACTURING CO. INC.: A final dividend of 12½ cents on the Class B stock, its first payment on the Class B since a similar disbursement on Dec. 23, 1937.

» BEECH AIRCRAFT CORP.: Net loss for year ending Sept. 30, 1938, $1,609, compared with net income for 1937 of $14,042. This is equal to 6 cents each on 239,349 capital shares. Net sales of $1,141,398 for the twelve months ending Sept. 30, 1938, represent an increase in volume of 45 per cent over the previous fiscal year.

» BREEZE CORPORATIONS, INC.: For nine months ending Sept. 30, 1938, profit, before Federal taxes, of $127,302. A dividend of 40c. per share on the common stock has been declared payable Dec. 17, 1938. Unfilled orders as of Sept. 30, 1938 of approximately $1,500,000 do not include Breeze Corp. of Great Britain, Ltd., in which the corporation has a 40 per cent interest. Unfilled orders of the affiliated company for the same date exceed $1,000,000.

» CONSOLIDATED AIRCRAFT CORP.: A special cash dividend of $1 per common stock share, for the year ending Dec. 31, 1938, payable Dec. 19, 1938. This is in addition to the regular quarterly cash dividend of 75 cents per share on the Convertible $3 Preferred, payable Dec. 23, 1938.

» EX-CELL-O CORP.: A dividend of 20 cents, payable Dec. 22, 1938, against 10 cents paid previously.

» GRUMMAN AIRCRAFT & ENGINEERING CORP.: A 25c. dividend payable Dec. 27, 1938, being the third 25c. dividend declared this year, an increase of 50c. over 1937 payments.

» PENNSYLVANIA - CENTRAL AIRLINES CORP.: For ten months ending Oct. 31, 1938, net profit of $967 against net loss of $117,613 for same period last year. Net income for October, $16,844, compared with loss of $7,833 in Oct. 1937.

» SEVERSKY AIRCRAFT CORP.: For nine months to Sept. 30, 1938, net loss of $328,087.

» SPERRY CORPORATIONS: A dividend of $1 per share, payable Dec. 19, 1938 to Voting Trust Certificate holders. Total payments for 1938, $1.60, against $1.20 for 1937.

» TRANSCONTINENTAL & WESTERN AIR: For three months ending Sept. 30, 1938, operating loss of $129,697, after depreciation of $257,223 and operating taxes of $29,703. Compared to operating loss for same period in 1937 of $107,380, after depreciation of $233,072 and operating taxes of $25,622. Net loss for third quarter of 1938, $210,988, after losses on other income of $81,291; compared with operating loss for same period in 1937 of $63,689, after profit on other income of $43,690. Revenue passenger miles during third quarter of 1938 gained 5.9 per cent although operating revenues decreased 5½ per cent.

» UNITED AIRCRAFT CORP.: A dividend of 75 cents per share on the capital stock, an increase of 25 cents over the usual payment of 50 cents per share. Payable, Dec. 15, 1938; shares outstanding, 2,609,377.

Bids Asked On Rotary-Wing Shuttle One Terminal To Be P. O. Roof-Top

THE POST OFFICE has taken another big step toward the improvement of the Country's air mail service. It has asked for bids on a 6-mile rotary-wing aircraft shuttle between the Camden, N. J. airport and the roof of its Philadelphia Post Office Building. If a year of experimental operations work out successfully, similar shuttles will be organized in other American cities whose air terminals are located in suburban areas.

Philadelphia was selected because local interest in the nearby Pitcairn and Kellet autogiro factories led the roof of the new Post Office Building to be designed and built for just such a purpose. Not only it is wide, flat, and strong, but it is free from ventilators. Five round trips will be authorized daily, except Sundays. After three months the Postmaster-General may require night operations. Aircraft used must be capable of carrying 150 pounds of mail per trip and must be approved by the C.A.A. Bids may be submitted up to 12, noon, Jan. 17.

R. G. Kellet, General Manager of the Kellet Autogiro Corporation, issued the following statement:

"Daily flights from Camden to Philadelphia with the mail will be an interesting, novel and valuable experiment. As the city's only autogiro manufacturers we are prepared to cooperate fully in the test. We look forward, today, however, to expansion of the service from this to other cities, saving many hours of time in the delivery of mail over important short haul routes where airplane service would be impractical because of the airport problem. What will occur in Philadelphia next year will be only a preliminary step toward this ultimate goal."

AIR TRANSPORT INDICATOR

December 1, 1938

145.6

Which is the ratio of the revenue passenger miles reported by the Air Transport Association as carried by all domestic airlines during November, 1938, to the corresponding figure for November, 1937.

41,374,119 pass-mi. thus sent the indicator to highest mark since Feb. 1. First eleven months totals: 1937 — 381,563,486; 1938 — 438,695,563, up 14.9 per cent.

A STUNT IN 1935—A regular service in 1939. Photo shows Jim Ray ceremoniously handing PMG Farley a sack of mail he has just flown onto the roof-top of the Philadelphia Post Office. Next year pilots named Elmer will do similar to mail clerks some five times each day.

T. B. WILSON
Heads TWA's Board

TWA Makes More Shifts

JACK FRYE, President of TWA, has announced the following appointments: T. B. Wilson of San Francisco, to be Chairman of the Board and a Director of the company. Wilson has been in the transportation industry since 1912. He has been Supervisor of all transportation for the Southern Pacific Railroad System and President of the Southern Pacific Motor Transport Company (later merged in Pacific Greyhound). At the time of his appointment, he was Vice-President and General Manager of the Alaska Steamship Company.

V. P. Conroy, formerly Sales Manager for TWA and a 15-year veteran in airline work, to be General Traffic Manager.

John C. Graves, another veteran and formerly Chicago Traffic Manager for TWA, to be Sales Manager.

J. A. Thomas, formerly New York Traffic Manager for Pan American, to succeed Graves.

C. E. Fleming to be Assistant to the President.

E. A. Hechert to be Assistant to the General Traffic Manager.

LaPorte to Atlantic

CAPT. ARTHUR E. LAPORTE has replaced Capt. R. O. D. Sullivan as skipper of the Bermuda Clipper. La Porte, one of Pan American Airways' "Masters of Ocean Flying Boats", has flown the 9,000-mile Pacific crossing no less than 50 times. Capt. Sullivan has been assigned to Seattle for familiarization with the new 314-Clippers.

Air Express Gains

THE RAILWAY EXPRESS AGENCY reports all-time highs in gross revenue and number of shipments handled in October. Shipments totalled 73,758 a gain

of 9 per cent over October 1937. For the first ten months of 1938 air express shipments were up 4.9 per cent over the corresponding period of last year.

U.A.L. Leases Planes to E.A.L.

EASTERN AIR LINES, with business running approximately 45 per cent ahead of last year, has worked out an agreement whereby it is leasing at least five DC-3 mainliners from United Air Lines for the four months starting Dec. 1. A number of United pilots and co-pilots have been given furloughs and transferred to Eastern payrolls for the same period.

CHARLES R. SPEERS
To sell New York for American

New Manager for A. A. in N. Y.

CHARLES R. SPEERS, former Detroit Sales Manager for American Airlines, has been appointed New York District Sales Manager for that airline to succeed A. J. Gariepy resigned. Speers, though only 31, has been in air line traffic work for ten years.

United Gets Walker

J. B. WALKER, for three years Vice-President in Charge of Traffic for TWA has been appointed Regional Traffic Director for United Airlines with headquarters in New York. M. P. Bickley will remain UAL's New York District Traffic Manager.

Northwest Promoter Kinsman

A. G. KINSMAN, West Coast Traffic Manager for Northwest Airlines, has taken over the duties of Acting General Traffic Manager with headquarters in St. Paul, according to a recent announcement by Croil Hunter. A veteran air line traffic executive, Kinsman served with Boeing Air Transport, United, and T.W.A. He has been West Coast Traffic Manager for Northwest since 1934.

LOGGING THE LINES

Air Transport Drift Sights

by DAN SAYRE

Lawsuits point at two air line weaknesses

Poking our nose into other people's lawsuits is one form of recklessness to which we have never been attracted. But lawsuits involving air lines made so much news last month that we just can't pretend that we didn't hear about them. Besides, this last batch seems to us to point out two situations which ought to be remedied.

Boeing vs. TWA. On Nov. 22, the Boeing Aircraft Company filed suit in the King County (Washington) Superior Court, alleging that TWA had breached the contract under which it had agreed to purchase six four-engined 307 transports. TWA, so ran the complaint, had at various times during last June and July represented to Boeing that it would be unable to perform its obligations under the contract (about $1,590,000 worth). Jack Frye, replying for TWA, denied Boeing had any grounds for suit. In fact, he said TWA would seek to recover damages because Boeing had failed to deliver the ships by Oct. 21, 1938, as per contract.

How this will work out, we don't know. Whether TWA will take delivery on the six planes—when, as, and if they are completed—we won't even guess. But it doesn't look now as though TWA will get four-motored equipment much ahead of the other domestic lines, even if the deal is eventually consummated.

Even more important, to us, is the situation which permitted the Boeing-TWA misunderstanding to arise. There never should be the remotest grounds for suspicion that an air line which has contracted for new equipment cannot go through with the purchase.

Railroads have the answer: Equipment bonds or equipment-trust certificates now used by even the strongest rail carriers to finance the purchase of new equipment. Such securities sell well. They are based on the soundest sort of financial practices. To an air transport industry faced with steadily increasing expenditures for larger and larger equipment, they would be a Godsend. In fact, it would not be too much to say that unless the banks work out some such mechanism for us, the prospect of four-engined equipment is definitely limited.

Two other lawsuits made headlines. Mrs. Osa Johnson appeared in court to press her $700,000 damage claim against Western Air Express, United Airports of California, the ground crew at Burbank, and W. W. Lewis, pilot of the plane in which she and her husband were passengers when it crashed Jan. 12, 1937. Mrs. Cleo L. Musick filed suit against Pan American Airways for $300,000 because, she alleged, the Samoan Clipper in which her husband met death Jan. 11, 1938, was "defectively designed and constructed".

Again we risk no opinions on the merits of the cases. But the mere fact that air lines can be sued for any such sum as $1,000,000 for two deaths is in itself one of the factors of uncertainty which keeps this business in the financial speculation category.

Steamship lines have more than an answer to this one. By statute and ancient maritime usage their lability, even when the wildest negligence can be proved, is hardly enough to pay the claimant for filing suit. No airline proponent would ask for any such set-up as that. But liability ought to be limited to *some* finite maximum.

A. G. KINSMAN
Takes over Northwest traffic

Britain Unites Its Forces

Ministry announces plans to merge Imperial and British A'ways into Public Corporation.

AIR MINISTER SIR KINGSLEY WOOD spends most of his time trying to build "defensive" bombers for His Majesty's airmen to use against enemy forces. But in a recent parliamentary debate he stood up and lobbed a bombshell right into the center of British transport aviation. The Government, he announced, had prepared a plan for the merging of Imperial Airways and British Airways into a single "Public Corporation". Full details would be contained in a Bill which would be presented to Parliament "at an early date," he concludes.

Even since the Hambling Committee (way back in 1923) took a look at the mess of British lines shouting for help and recommended their merger into one big subsidized company, British civil aviation policy has had its feet all tangled up trying to go two directions at once. One was full of ambition to keep Britain in the lead in the air by building up a network of Empire and foreign lines with first rate service and equipment. The other was always piously pointed out by every investigating commission that came along—that the lines should become self-supporting as soon as possible.

When the Cadman Committee early this year came out admitting the need of heavy subsidies for a long time and inferred that the Imperial management had too many fuddyduddies who worried more about keeping up the dividends than about extending routes and renewing equipment, the picture began to change. The necessity of improving the service was put first, and with the Air Ministry realizing it was going to be Santa Claus for a good while longer, it began looking for ways to get the most for its money.

The original Post-Cadman plan figured on giving the empire lines to Imperial, which was to clean house and pep itself up. Other foreign lines were to go to up and coming British Airways. This solution left a lot of loose ends hanging, though: Imperial hated to give up European routes it had pioneered (it has always thought British Airways chiseled into its territory); British Airways drew the projected South American line which certainly fitted better into Imperial's operating setup and experience, and the government was still left holding the financial bag for two lots of stockholders who expected to be supported in the style to which they were accustomed—or better. The old idea stated by the Fisher Committee in 1935 that competition between two subsidized British companies was necessary to keep both on their toes still remained even in a world where both were facing the toughest kind of competition from unified lines like Lufthansa, backed by governments that put prestige a long way ahead of pennies.

International

SIR KINGSLEY WOOD
Lobbed a bombshell

To add to the grief, British Airways found the date it was to take over its new job coming nearer and nearer with no equipment to be had. One of Imperial's sorest spots has been lack of modern ships on its European runs, and it wasn't going to be a pal and turn over any that it did have to an outfit it felt had slipped a knife in its back.

Mechanics of the merger will be pretty simple. A public corporation (on the order of the British Broadcasting Co. that Sir John Reith headed before he took over the Chairmanship of Imperial) will buy out the present stockholders of Imperial and British Airways, raising the money by issuing fixed dividend stock (probably around 5%) guaranteed by the government. The Air Ministry hopes to make the present stockholders say uncle without much persuasion—if a deal can't be turned the question of price will be put up to an arbitration committee whose word will be final.

AS OTHERS FLY IT

A Birdseye-View of Aviation Abroad

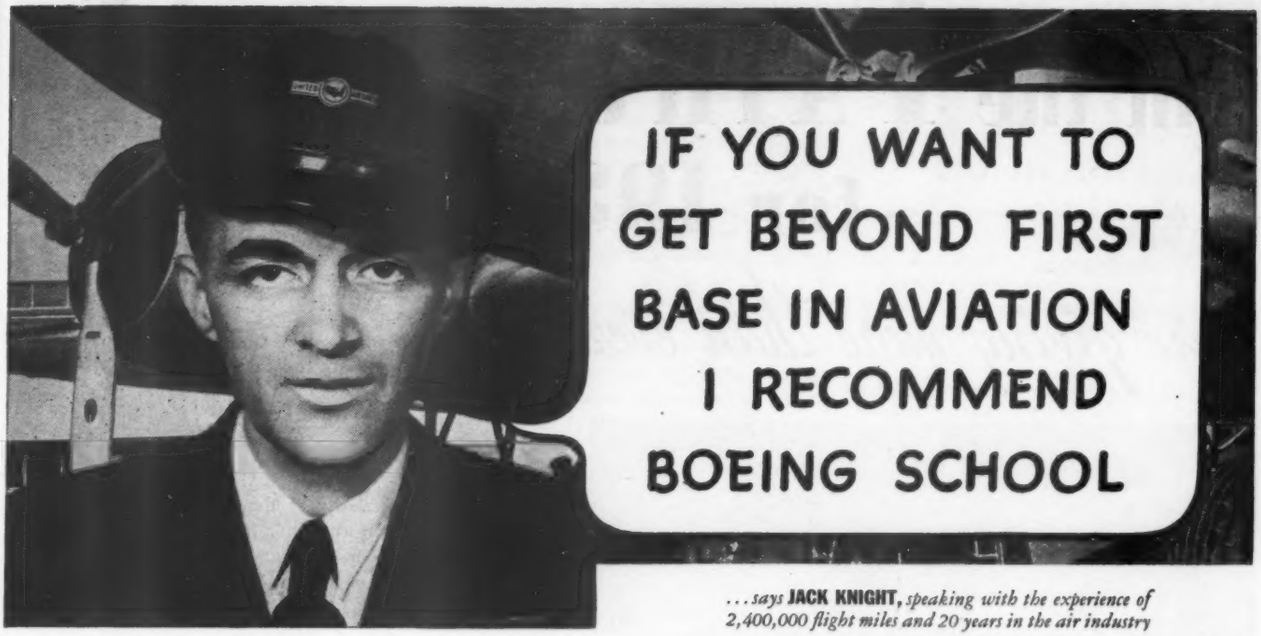
The Christmas rush of Empire airmail is expected to hit an all-time high this year, with 350 tons between December 1 and Christmas counted on. To meet it Imperial has cancelled all passenger service on Empire lines for this period and will load everything available with mail. There are hopes that a couple of Ensigns and some super-Empire boats will be ready to lend a hand, but in the meantime a bunch of ancient Hannibals, Scyllas, and such veterans were dusted off. Even the Mercury was stuffed full and shot off to Egypt to earn its keep.

More statistics from around the world show Canada turning in some big-league figures for 1937, with over ten million airplane miles and two million ton miles of mail and freight alone. Although plane miles increased only 35%, the ton mile total is almost double that of 1936. . . .One effect of the chopping up of Czechoslovakia that hadn't been expected was the push it gave to air traffic. All the European lines connecting with the country were swamped with outbound reservations, and traffic on domestic lines jumped to four times the normal figure when the former main rail routes were cut by new frontiers. . . .Peru set a record that is probably unique—less business in the first nine months of 1938 than the same period of 1937. Passengers dropped 9%, freight 20%, and mail 13%. It's all blamed on the opening of a lot of good highways through the country.

The "Canadian order" has finally been placed—the type is known to be the Handley-Page Hampden bomber and the number is said to be somewhere around a hundred. Canadian Vickers, Canadian Car and Foundry, and Fairchild will make parts for an assembly plant at Montreal, while National Steel Car Co., Fleet, and Ottawa Car and Mfg. Co. will feed another near Toronto. Deliveries are expected to start in 1940, and after this warm-up order a real one for advanced types is promised. Part of the deal is that the manufacturers have signed up to maintain plant capacity to handle such orders for ten years.

Germany lost two of her finest pilots when Joachim Blankenburg and Robert Untucht were killed with nine others in the crash of a Ju.90 at Bathurst during a survey flight for Lufthansa. Blankenburg had over 100 Atlantic flights to his credit. He was in on the early catapult flights from the Bremen and Europa to New York, then carried on to play a prominent part in organizing Lufthansa's South Atlantic line and survey flights over the North Atlantic . . . .More fortunate were the crew of the Focke-Wulf Condor that made a four leg Berlin-Tokyo flight of 8375 miles in 47 hours elapsed time. On the first lap of the return flight the plane made a forced landing due to engine trouble in Manila Bay and was lost, but all aboard escaped without serious injury.

The flight had more behind it than mere diplomatic goodwill. Germany hopes to sell such four-engined planes to Japan, Manchukuo and Holland.



IF YOU WANT TO GET BEYOND FIRST BASE IN AVIATION I RECOMMEND BOEING SCHOOL

. . . says **JACK KNIGHT,** *speaking with the experience of 2,400,000 flight miles and 20 years in the air industry*

***The most experienced air line in the world founded and maintains Boeing School of Aeronautics . . . to assure aviation a reliable source of trained young men*—career men**

From your very first day at this famous school, you realize that you are actually in aviation.

Your shops, laboratories and lecture rooms and the flight house are located right in the heart of aviation activities; the Pacific Coast terminus of United Air Lines. Your courses are directly under United supervision.

An average of only 8 students per instructor means you get to know your teachers intimately. And you rub shoulders with pilots, operations men, engineers, officials . . . have opportunity to meet men with years of experience in the field you're aiming at.

You graduate with the most comprehensive background of training that the nation's foremost air school can give you—fully equipped to carve for yourself a worthwhile career in aviation. The outstanding record of Boeing School-trained men throughout the world is your assurance of this.

• • •

HIGH SCHOOL GRADUATES ATTENTION! Entrance requirements at Boeing School of Aeronautics now offer you new opportunities. Free bulletin describes full range of Boeing School Career Courses—contains complete vocational guide to employment and promotions in all fields of aviation. Fill out the coupon below. Send now for your free copy!

GRADUATIONS AND PLACEMENTS

BOEING SCHOOL RECORD
(November 1937—October 1938)

Months	*Graduates*	*Placements*	*No. Co's Employing Graduates*
1937			
November	2	2	2
December	29	7	3
1938			
January	7	14	6
February	1	9	7
March	40	16	6
April	6	13	3
May	6	12	6
June	30	5	4
July	4	8	4
August	2	3	3
September	29	12	10
October	1	6	5
TOTAL	157	107	28

Boeing School of Aeronautics

A division of UNITED AIR LINES

U. S. Government approved in ALL departments—Private and Commercial Flying, Mechanic Training, and Repair Station

A FULL RANGE OF CAREER COURSES

There's one specially designed to provide a thorough foundation for success in *your* chosen field of aviation

Check the course or courses you're most interested in:

Courses requiring High School only:
- ☐ Airline Pilot and Engineering
- ☐ Airline Operations and Engineering
- ☐ Airline Mechanic and Operations
- ☐ Commercial Pilot and Operations
- ☐ Airline Mechanic
- ☐ Private *(or)* Solo Pilot
- ☐ Limited Commercial Pilot
- ☐ Aircraft Sheet Metal

Course requiring 2 yrs. of College:
- ☐ Air Transport Engineering

Courses for engineering graduates only:
- ☐ Airline Technician
- ☐ Airline Meteorology

Course requiring special training:
- ☐ Special Airline Pilot

NOTE: Link Trainer and modern multi-motor instruction available to students in all courses.

Boeing School of Aeronautics,
Dept. L1, Airport,
Oakland, California.

GENTLEMEN: Please mail me—without charge—the 1939 BOEING SCHOOL BULLETIN containing complete information on the school and courses I have checked at the left.

Name _____

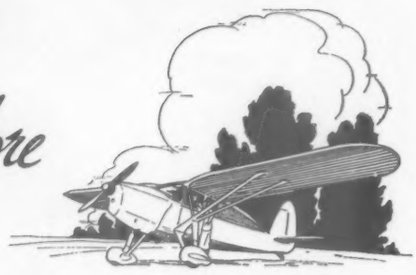
Address _____

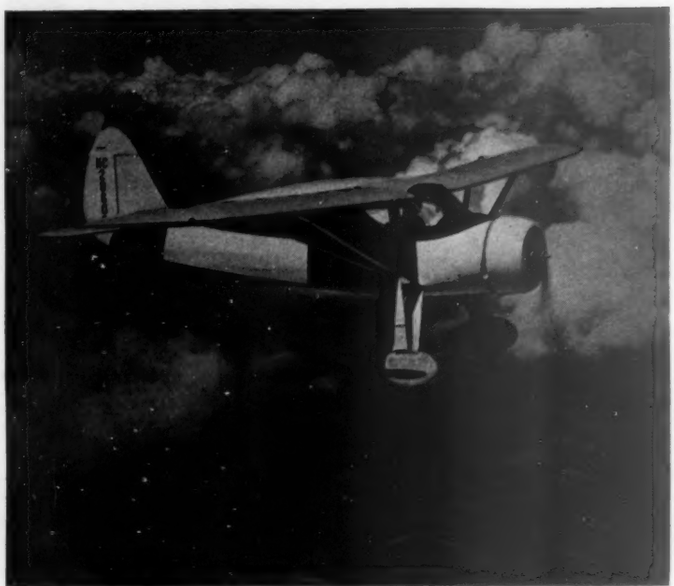
City _____

State _____ *Age* _____

In the FAIRCHILD "24" for 1939

we're giving more than ever before





Behind the popularity of the Fairchild "24" are years of proven performance . . . hundreds of thousands of flight hours by hundreds of enthusiastic owners in all parts of the world.

During 1938, for instance, sportsmen, business executives, government officials and commercial operators purchased more Fairchild "24's" than any other 4- or 5-place cabin planes in America.

They bought because, in ease of handling, utility, safety and economy, this ship has achieved a record of being the finest a man can buy regardless of price. To attempt improvement seemed impracticable . . . but we've equipped the Fairchild "24" for 1939 with such added features as hydraulic brakes, a steerable tailwheel, improved landing gear, ventilators of advanced design, optional glass windows, even more beautiful cabin interior and many other new features.

In 1938, the Fairchild "24" was the biggest seller because it was the biggest value. In 1939, this splendid ship is an even greater value . . . and an even more logical choice for the private owner.

NEW Hydraulic Brakes add greatly to ground handling ease and control.

NEW Oleo Design in gear results in straighter roll after landing.

NEW Steerable Tail Wheel (automatic, full-swiveling) combined with the new brakes and oleos, now makes the "24" as perfect on the ground as in the air.

NEW provisions for Airwheels will interest those who operate on rough fields.

NEW Door Windows of Plexiglass or Safety Glass are optional and considerably reduce the noise level.

NEW Ventilators on all models are the airliner type and assure comfort in hottest weather.

NEW Instrument Panel design affords extra space for radio equipment.

NEW Seat Contours with even Finer Upholstery result in a luxury of restful ease and individuality in appearance.

NEW Ranger Engine Mounts and Cowling give smoother operation, better appearance and quicker accessibility.

Complete details upon request.

FAIRCHILD

AIRCRAFT CORPORATION

Hagerstown *Maryland*

Patrol Training Squadron 4 Wins Schiff Safety Trophy

THE HERBERT SCHIFF MEMORIAL TROPHY, awarded annually to the Naval air squadron with the best record for safety during the previous fiscal year, has been won by Patrol Training Squadron 4, stationed at Pensacola, Fla. Flying a total of 19,771 hours without an accident of any kind, PT Squadron 4 earned maximum time bonuses and minimum penalties in a list of some 92 competing squadrons. President Roosevelt was to present the award to Lieut. Comdr. Arnold J. Isbell, the squadron's skipper, on Dec. 21. Aviation Chief Machinist's Mate Tom Carden was to represent the enlisted men of the squadron at the presentation.

Next in rank after Patrol Training Squadron 4 came:

Patrol Squadron 9, Scouting Force, San Diego; flying time 3,824 hours; Lieut. Comdr. W. G. Tomlinson, commanding; stood first among squadrons operating with the fleet.

Patrol Squadron 5, Scouting Force, Coco Solo, Canal Zone; flying time 3,524 hours; Lieut. Comdr. W. K. Berner, commanding.

VB Squadron 6, attached to carrier Enterprise; flying time, 3,354 hours; Lieut. Comdr. F. J. McKenna, commanding, first among carrier squadrons.

VCS Squadron 6, attached to Cruiser Division 6, Scouting Force; flying time 5,595 hours; Lieut. Comdr. William N. Updegraff, commanding; first among squadrons operating from battleships and cruisers.

Army Orders Robots

Six due for delivery this summer.

THE WAR DEPARTMENT has let a contract for six radio-controlled robot planes to the Reginald Denny Industries, Inc. of California. This particular batch are intended purely for experimental tests. With wing spans of twelve feet, they will be about eight feet long. They are to climb to ceilings of 7,000-8,000 ft.; make 75 m.p.h.; cruise for half an hour. They will be launched by catapult. Delivery is expected next summer. Three will be assigned to the Coast Artillery; three to the Air Corps. If tests are successful orders will follow for larger and faster models for use, of course, as flying targets for anti-aircraft units, pursuit squadrons, etc.

The British have used such robot planes for several years, their "Queen Bees" being full scale aircraft slightly larger than a DH Moth. With 130 hp. engines they are reported capable of about 100 m.p.h. and, to judge from movies, they take-off, go through all the simpler evolutions and land with a considerable degree of precision. Incidentally they are used extensively by the Royal Navy, equipped as twin-float seaplanes.

A more recently developed British model mounts a 355 hp. engine and is consequently much faster than the Queen Bee. It also has a fancier name —"Airspeed Queen Wasp," no less. Speaking of names. Reginald Denny, the movie actor and power-model enthusiast who heads Reginald Denny Industries, Inc., may live to regret his contract. Unless we're badly mistaken the U. S. Army man's term for any robot aircraft is going to be a "Reginald Denny" from this Summer forth.

North American Gets Contract

ASSISTANT SECRETARY OF WAR, LOUIS JOHNSON, last month announced that an order had been placed with North American Aviation for 74 O-47B observation planes. The contract price was given as $2,346,128 and included spares. A three-place mid-wing powered with a Wright Cyclone of 850 hp., the O-47B is almost identical with earlier North American observation models contracted for by the Air Corps. Of this particular order, 50 are destined for the National Guard; 24 for the regular army.

Hitler Launches Carrier

Resembles U. S. "flight-deck cruiser" dream.

GERMANY'S ARMAMENT EFFORTS took a significant step in a new direction last month with the launching at Kiel of a 19,250 ton war ship, a sort of combined aircraft carrier and cruiser. Designed to carry at least forty planes, it will also be fitted with an unusually heavy complement of 16-inch guns. A sister ship is under construction. Chancellor Hitler and many high Nazi officials including Field Marshall Goering attended the launching ceremonies. Interestingly enough these new ships seem to fit pretty closely with the specifications for "flight-deck cruisers" long-discussed as additions to the U.S. Navy.

ON MISSION

With the Services

The President's appointment of Commander Reichelderfer as Chief of the Weather Bureau (See page 52) is a fine tribute to the Aerology Section of the Bureau of Aeronautics.

Squadron VS-12R, of Kansas City, got a second helping of publicity last month as Rear Admiral Hayne Ellis presented it with the Noel Davis Trophy. That's the way these trophies go: A round of applause at the announcement of the winner; another round when the trophy is ceremoneously conferred. But this time the boys certainly rated it—This is the third time in succession that particular squadron has won that particular hard-to-get-trophy.

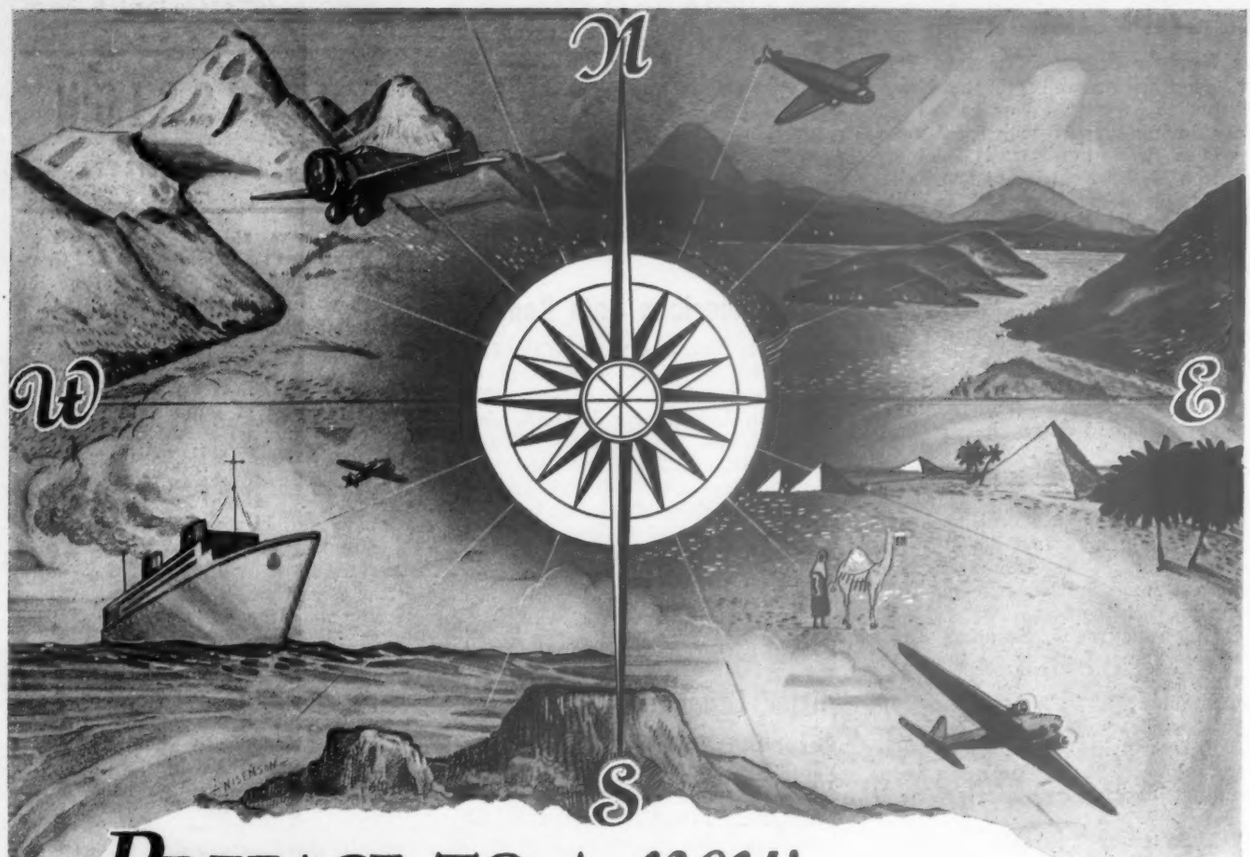
Congressman Scrugham of Nevada, chairman of the Naval Appropriations Committee, took a commission on a junket to Mead Lake (behind Boulder Dam) last month. Object: to look it over as "a huge inland air base for the navy."

What's the Navy coming to, anyway? An air base in the middle of a desert; a trophy-winning squadron in Kansas City; a naval officer working as a big-shot in the Department of Agriculture. They'll be moving the Academy to the Dust Bowl next.

Panama Defense Note: Eighteen officers of the Italian Air Force have moved into El Salvador to train Salvadoreans in the art of flying Capronis and to do a job of mapping.

Wide World

BIGGEST BLIMP: Goodyear-Zeppelin last month launched one of the largest blimps ever built. The K-2, soon to be delivered to the Navy, has a capacity of 404,000 cu.ft.; a length of 246 ft.; a maximum diameter of 76 ft.



PREFACE TO A *new* AIRCRAFT COMPASS

Since time out of mind the magnetic compass has been the basic intrument of all terrestrial navigation. On earth, on sea, in the air, the suspended magnetic needle is still the navigator's basic guide.

But though special compasses have been made for use in air navigation, even the best hitherto available impose undue nervous strain on the pilot and require his concentrated attention. If he uses an adaptation of the horizontal "ship's compass"— a bulky, heavy instrument that has to be viewed from above—he must shift his attention from the important indications of his panel instruments. If he uses any of the present types of panel compasses, he finds intense mental effort and practically continuous observation necessary. For, whereas the normal panel instrument's dial is fixed and the pointer rotates, all present panel compasses have a *fixed pointer* (lubber's line) and a *rotating dial.* This compels the pilot to single out one number from a row of moving numbers and to hold it behind the lubber's line —obviously an attention-holding task.

The truth is that air pilots require a better compass. However, knowing that no basic improvement of the magnetic compass has ever been made, they have assumed that perhaps none is possible.

But one engineer with determination and vision, working with a new, providentially-discovered material, has finally developed an aircraft compass "to be read like any other instrument". Paul Kollsman is that engineer; the Kollsman Instrument Company is the manufacturer that has perfected it; and *next month's* advertisement will formally *introduce and describe this new compass*... AVIATION MARCHES ON!

KOLLSMAN INSTRUMENT CO., INC.

8008 FORTY-FIFTH AVENUE ELMHURST, NEW YORK

WESTERN BRANCH: GRAND CENTRAL AIR TERMINAL. GLENDALE. CALIFORNIA

AVIATION'S OPERATORS CORNER

Tagging the Bases with

LES NEVILLE

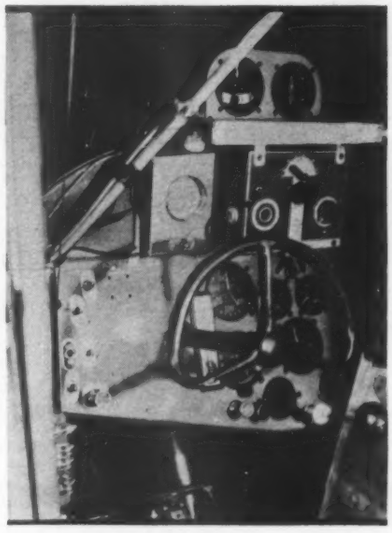
Aeronca Non-Stop 2785 Miles

You can go places in light planes is the inescapable conclusion drawn from Johnny Jones recent non-stop, non-refueling transcontinental flight in a Continental Aeronca Chief. Johnny, who is president of Jones & Humeston, Inc., West Coast district managers for Aeronca, took off at 6:31 A.M. November 29 from Los Angeles Municipal Airport with 146 gallons of gas and landed at 4:17 P.M. the next day at Roosevelt Field. His take-off run was under 1,000 ft.; elapsed time, 30 hr., 47 min.; distance, 2785 miles; and average speed, 91 m.p.h. When he landed he had fuel for five more hours cruising or about 450 miles. Gross weight at take-off was 1925 lb. Total cost for the fuel and 2 qt. of oil consumed was $25.70. Try to get that kind of mileage out of your automobile.

All this didn't come about accidentally. For a long time Vice-Presidents Friedlander and Wootten have been racking their brains to devise a light plane record flight that really proved something. They knew their ships had it in them but the problem was to let others know about it. Preparations began early in September and all the details were carefully worked out in advance. The ship, a stock model excepting the extra tankage, was completed November 3 and flown to Wayne County Airport where extensive tests were made by Aeronca's Chief Engineer, James A. Weagle. Then Johnny flew 965 miles from Cincinnati to Fort Worth for a test hop. On the flight Johnny took the American Airlines route and benefitted greatly by the weather information received by radio from AA stations. He maintained his schedule to within 5 or ten minutes at every check point.

General check-up, preparation, and fueling for the flight was done by California Flyers School of Aviation, Jones' alma mater.

C.A.A.'s Private Flying Section expands to a Division in the organization according to a recent announcemet. Grove Webster continues at the helm. This is part of the general program to give greater recognition to the problems of the private flyer. Elaborate plans to expand civilian flying are under discussion by members of the Authority. All that is needed is for someone to foot the bill. With every other major country in the world providing aviation training for its youth at ridiculously low cost, there is every reason to believe that those who hold the purse-strings will see the light. A civilian training program one-fourth the size of those of either England, Germany, or Italy would put this industry on its feet.



Tanks to the right of him, tanks behind him, Johnny Jones watched these dials in front of him but had no excitement.

Ton-tested Aeronca. Vice-presidents Wootten (left) and Friedlander (right) with Pilot Johnny Jones shortly after the flight.

Light Planes to Miami Races

Swarms of light airplanes will be descending on Miami in a few days and the party, as far as gas and oil is concerned, is on good old Gulf as usual. The plan in brief is for Aeroncas, Cubs, and Taylor Young to converge on Orlando from three major divisions,—Eastern, Central, and Southwestern. From Orlando the concentration proceeds to Miami via Fort Pierce and West Palm Beach, arriving January 6. Details of the itinerary follow:—Eastern Division: Gas and oil for New England ships is available at Boston Municipal; for Canadian ships at Buffalo. New England ships will proceed via Roosevelt Field, Central Airport, and College Park, Md. Planes from the Buffalo area will assemble at Lock Haven, Pa., and leave with the Lock Haven Wing, January 1.

Central Division: Official starting point, Louisville Municipal Airport, January 2. Free gas and oil for ships en route to Louisville may be obtained at Lunken, Hoosier, South Bend Municipal, Ft. Wayne Municipal, Cleveland Municipal, Norton, Detroit City, Capitol City (Lansing) and Kent County (Grand Rapids) Airports. The Memphis Wing joins the Southwestern Division at Montgomery, departing January 3. Southwestern Division: Leaves Dallas Municipal, January 1. Picks up San Antonio Wing at Lake City, Fla., on the evening of January 3. San Antonio Wing leaves January 1.

Don't ever miss a 'Gator Party if you are invited, and all private and non-scheduled aviation is on the list for Orlando's Sixth Annual Air Party, to be held in cooperation with the annual rituals and frolics of the Florida Flying Alligator Club International. Festivities are at the Orlando Country Club, January 4, under the able direction of Grand Scaly Alligator Ed Nilson. They are timed to the arrival of the 1939 Light Plane Cavalcade and will con-

stitute a tribute to the C.A.A. and its Private Flying Division. Airminded Mayor S. Y. Way will be on hand to welcome you.

CELEBRATES ANNIVERSARY: Ray Applegate, Aircooled Motors' sales engineer did a fine job getting acceptance for the new engine.

Flight instruction is on the spot all over the country. A recent move to improve public relations of the smaller operators took place at Orlando, Fla., December 7 when an organization to be known as the Professional Flight Instructors of Florida was formed as an affiliate of the Florida Aviation Association. Alex F. Knothe, commercial operator at Orlando Municipal Airport, was elected president and Otis Beard of St. Petersburg, vice president. A second meeting of the Professional Flight Instructors has been called at Miami on January 7 during the All American Air Maneuvers, when the standardization of a flight curriculum to be used by all members will be discussed.

Is normal flying a public nuisance? This will be decided in an airport legal case of interest to the entire aviation industry set for hearing in Los Angeles courts on January 10, 1939. Called the people of California vs Dycer Airport, the case will determine whether a private airport can be closed because its normal flying activities constitute a "public nuisance" with respect to local residents who object to the noise and dust created, and to planes flying low during landing and taking off. Bertrand Rhine, prominent private pilot, is attorney for the airport. Although operated for years as Dycer Airport by E. A. Dycer, the field is now operated by Elmer Rily under the name Southwest Airport. Located about eight miles from downtown Los Angeles on south Western Avenue, Southwest Airport is a base for some forty or fifty privately owned and operated aircraft. The field has been in continuous operation for about twelve years. Originally the area consisted of open country. Recently surrounding territories have been subdivided and homes have been thickly built. The new residents of the area now claim that they are in the majority interest, they don't like the airport, and therefore the city should force it to close. If this action succeeds it will establish legal precedent endangering the life and tenure of every private airport in the country to which adjacent residents may object. So far as is known no serious damage or injury to any resident in the Southwest Airport area has occurred to date and flying operations have been safely and reasonably conducted in accordance with Federal regulations.

WPA has spent $5,199,977 in California on airport improvements since July 1, 1935. Current work is employing 1,500 WPA men in connection with improvements to Los Angeles Airport, and Reeves Field, Los Angeles Harbor, to cost a total of $1,398,544. Additional work for which application has been made will include expenditure of $221,814 on improvements to Long Beach Municipal Airport, and $1,692,919 on improvements to airports at Barstow, El Centro, Ontario, Palm Springs, Riverside, and Santa Barbara.

New Beech sales outlets include Hangar Six, of Stinson Field, San Antonio, Tex., and Atlantic Aviation Sales, Inc., of New York. Hangar Six gets a dealership for all Texas under the distributorship of Harry Hammill, of Austin. Atlantic Aviation Sales will handle the distributorship for New York State including Metropolitan New York City. Officers are: Stewart E. Poole, O. L. Davis, Chester A. Charles, and Edward A. Beacom. (*Turn to page* 70)

NEW DRESS: Indiana Air Service selects natty uniforms for its personnel

TO NORWAY: Ocean flier Thor Solberg accepts delivery of Cessna seaplane from Al Ulman.

The HOWARD, custom built to order for the past two years, has now been proven in millions of miles of flight by a distinguished group of owners, several of whom are listed among the veteran Private Flyers of the country.

Because of this acceptance, the Corporation has seen fit to arrange for adequate capital and improved facilities so that this superior, high-winged, 4–5 place cabin monoplane may be made available to the many who are now ready for better performance.

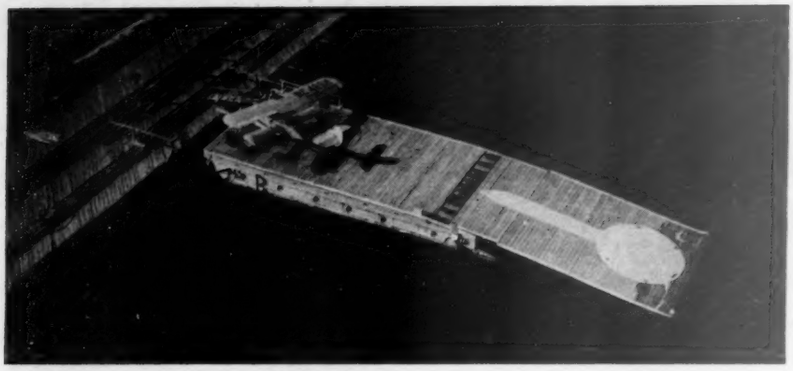
In addition to these essentials for adequate development and increased production, significant names have been added to the organization's roster, which assures experienced management and forward looking policies.

The HOWARD for 1939 will appeal to safeminded people who want the utmost in performance plus individuality without any sacrifice in practical desirables. Investigate the HOWARD—it has *'that something'* you've been wanting.

Howard
AIRCRAFT FOR 1939

ASK FOR CATALOG

Howard AIRCRAFT CORPORATION
5303 WEST 65TH STREET, CHICAGO, ILL., U.S.A.



MOVEABLE RAMP: Airplane view of the Marianni Seaplane Ramp.

THE REPORT CARD

Of Air School Developments

Special classes for Filipino Flyers have been opened by Airport Management, Inc., the Western Air College, located at Alhambra Airport, Los Angeles. A special Filipino air show recently staged attracted approximately 1200 Filipinos to the field, many of whom have entered the school for flight or ground instruction. The airport has recently completed a new north-west south-east runway to facilitate flight instruction under all conditions of wind. The standard runway is north-east south-west. A supplementary runway has been graded and oiled on an open area several miles south of the airport and is used for auxiliary student landing instruction on busy days. The airport management recently leased the Alhambra Hexhangar for a three-year period to the Lyons Van and Storage Company. This hangar building, originally erected to house ships of Western Air Express, has a ground area of approximately eight acres under one roof.

Eight months makes you a draftsman or tracer if you take the new home-study course of the Westwood Correspondence School, Los Angeles. Prepared by leading engineers of the aircraft industry, the course short-cuts the teaching of theory of mathematics and generalized mechanical drawing and plunges the student immediately into problems of aeronautical drafting and aeronautical engineering background.

To the welding department of Casey Jones School is added a Westinghouse Flex-arc electric welding machine. This is used for advanced instruction and considerable research is under way to determine the possible uses of electric welding on light gage material for aircraft production.

A special navigation course is now thrown in without extra charge with the regular four-month instrument course of the American School of Aircraft Instruments, Los Angeles. Instructor is Jack Compton. Enrollment at the school has doubled during December. Due to the popularity of the special instrument courses offered a home-study course has been prepared for out-of-state residents. Advanced students of the school have completed construction of a turn and bank testing stand which registers one degree intervals in a three hundred and sixty degree turn. Under development by the school staff is a new instrument known as the visbration meter, to give visual indication of vibrations existing at any specific test point on gyroscopic instruments, thus aiding perfect calibration of such instruments.

Geodetic construction is being tried by students at Aero Industries Technical Institute, Los Angeles. They have completed a fuselage of spruce strips which will, serve as a working model for all-metal sailplane of this type of construction that will be started later this year. Geodetic construction is used in the British Vickers long-range bomber, but has never been used in any approved type American airplane. Tests of the strength are usually made by static loading, as the mathematical analysis is extremely complicated. For the fuselage shown in the accompanying illustration spruce strips ½ in. by ¾ in. were used, over two bulkhead supports. With a new class of more than one hundred students starting November 7th, Aero I.T.I. now has the largest enrollment in its history and is rapidly pushing a new building program to accommodate additional resident students.

ORDERLY SHOP: This one is operated by the American School of Aircraft Instruments.

GEODETICS: Students of Aero I.T.I. building a geodetic fuselage.

PROPELLER PROGRESS

From the earliest days of metal propellers to the perfection of the quick-feathering type, Hamilton Standard Propellers have made possible continued improvement in the performance and safety of modern aircraft.

1925 METAL PROPELLERS. Hamilton Standard develops a practical adjustable-pitch metal propeller, first outstanding advance over old style fixed-pitch wooden propellers.

1933 CONTROLLABLE PITCH PROPELLERS. Hamilton Standard achieves world leadership through the development of the first practical controllable pitch propeller, awarded the Collier Trophy as the year's most important aeronautical achievement.

1936 CONSTANT SPEED PROPELLERS. Offering improved performance through automatic change of pitch, Hamilton Standard constant speed propellers become the most universally used item of aviation equipment in the world.

1939 QUICK-FEATHERING PROPELLERS. The immediate and general acceptance of the Hydromatic quick-feathering propeller for use on military airplanes and on the nation's airlines shows it to be worthy of a place in the distinguished record of Hamilton Standard achievements.

HAMILTON STANDARD PROPELLERS

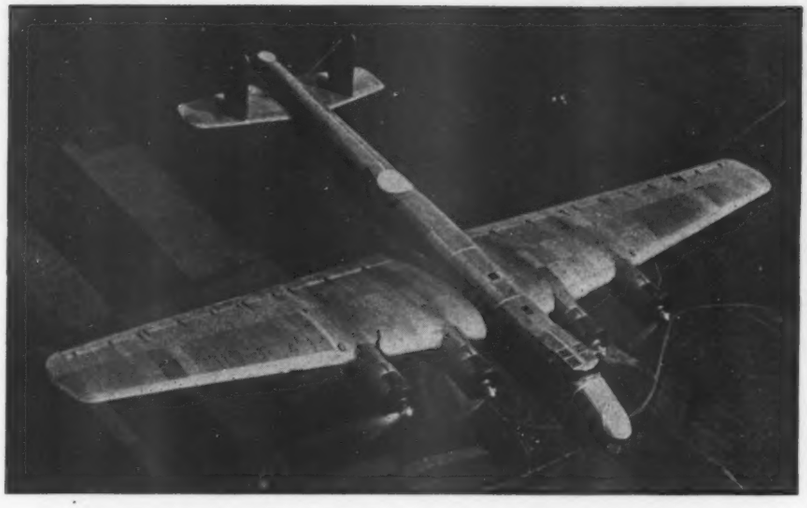
ONE OF THE FOUR DIVISIONS OF

UNITED AIRCRAFT CORPORATION

EAST HARTFORD, CONNECTICUT

VOUGHT

Perched on the decks of the great aircraft carriers...roaring away on scouting missions far out at sea . . . executing brilliantly a dozen different tasks, the Navy's Voughts provide powerful protection for every American home. Proudly they carry on the twenty-one year tradition of Vought performance in the United States Navy. Chance Vought Aircraft is one of the four divisions of United Aircraft Corporation, East Hartford, Connecticut.



Germany also has 4-engined bombers,—A Dornier DO-19

Editor's Travel Letter

(*Continued from page 21*)

new Templehof. Discussed many phases of long range over-ocean operations. While there I talked also to Herr Karl von Winterfeld, in charge of DLH's foreign office, and Joachim Mathias of the publicity bureau, both of whom had been very helpful to me in Berlin two years ago.

Next called on General Christiansen, head of the N.S.F.K. (National Socialist Flying Corps). This outfit is responsible for the training and organizing of young pilots in Germany while they are still in school before they are old enough for the Air Force. It controls a vast system of model building in public schools, and (through the Hitler Jugend) glider and sailplane training in schools and camps, and power flying in clubs. Here again is a long story—more of which elsewhere. The General and his aide Col. Sönnischen were most generous of their time in explaining the workings of the Korps.

A brief visit to the New York Times office in Kannonierstrasse to meet the Berlin correspondent, C. Tolischius, then back to Haus der Flieger, to attend a luncheon given for me by Prof. Dr. Karl Stuchty and Dipl. Ing. Grimm of the Lillenthal Society. There I met Dipl. Ing. Otto Hollbach, new editor of *Luftwissen*.

After luncheon, thanks to arrangements made by Dr. Merkel, I went to the Air Ministry to see the films of the flying of the Focke-Achgelis helicopter. The pictures were most impressive, and I hope that it will be possible for us to see an exhibition of this remarkable aircraft in the states. It looks to me as though they really have "got something" there.

Early Saturday morning I took off for London, again on a Lufthansa Ju-52. Had a stretch of very bad weather between Hanover and the Dutch border, but there we flew through a "front" and had a complete change for the better—almost clear and unlimited for the North Sea crossing to Croydon.

Through Major Mayo of Imperial, arrangements had been made for me to go over to Paris on one of the new Ensigns on Monday, but the weather turned out to be so bad, both in England (fog) and on the Continent (rain), that all services were cancelled out at noon. On the chance of catching the Ensign on the same service the next day, I decided to wait over in London rather than cross on the boat. So I took advantage of the delay to visit British Airways' maintenance base at Heston aerodrome. Mr. Shankland and Mr. Adkins of the London office made the necessary arrangements on practically no notice at all, and as a result I spent a most interesting afternoon with Messrs. Woods, Campbell, Orde, and Capel at the shops.

Here again, as in Amsterdam, many things about the shop looked familiar to an American, for the present B.A. fleet consists of six Lockheed 14s and six Electras, supplemented (for night mail only) by 3 Ju-52s and a couple of ancient Fokkers (the latter in reserve only). The Heston show is a very good one, and improvements are being made all the time. People there were much interested in the workings of our Maintenance Committee, and regretted that language difficulties and other things prevented the organization of a similar plan in Europe. Actually, information on maintenance is being exchanged in a small way between users of similar equipment (KLM and B.A., for example, on Lockheeds), and an extension of the idea may be possible.

Tuesday's events proved to be a bit disappointing. For, instead of finding an Ensign on the noon service to Paris, there on the tarmac at Croydon when the bus arrived stood one of the most dreadful bits of box-kitery I have seen for a long time—"Syrinx," companion piece to "Scylla" of about the vintage of 1931! There was nothing to it but to pile in—and presently with a great swishing of Kilfrost-coated wires and other hardware we were off to Paris at a good 90 knots. Fortunately, we fell in with a bit of a breeze (going the same direction) as we hit the Channel, and were down on Le Bourget in a shade under two hours instead of in the 80 minutes advertised for Ensign. Well, that was that, and we pushed on to Paris by bus and taxi, and made immediately for the Embassy and a preliminary session with Jack Ide.

Time was short (due to the weather delay) and the opening of the Salon was only three days away, with practically everyone in the Freneh industry running wildly about preparing for it. I had requested and received (thanks to the good offices of my old friend Henri Bouché of *"L'Aeronautique"*) Air Ministry permission to visit Potez, Gnome-Rhone and the Arsenel de Villacoublay. The Potez visit (the factory is in the north of France) had to be cancelled for lack of time, and I had to be content with what I could see of their products in the Salon. The other two visits, however, were made on schedule.

Henri Bouché, by the way, is one of the best-informed people on aviation in Europe, and at the same time one of the most charming men you could meet. I had the pleasure of several long talks with him over luncheon and in his office.

During the week in Paris I put in as much time as I could (between visits to the industry) in the Grand

Palais, both before and after the show opened. It is certainly an international gathering place and I ran into many old friends there, among them Ted Wright and Bob Farnsworth of Curtiss-Wright; Tom Hamilton and a flock of United people; Al Ulmann of Aviation Equipment and Export; Golovine of Rolls Royce; Charles Grey of the *Aeroplane;* Dr. Hymen of *Interavia*; Henry Seyffardt, and many others whom I had met hither and yon in my travels. Am glad to report that U. S. representation was much better this year than ever before.

Went one morning with M. Labeyrie of Air France out to see the maintenance base at LeBourget. The company is now using the 3-engined Dewoitine 338 for the colonial services and the fast new 2-engined Bloch 220 machines for the Paris-London run. All work on planes is done at LeBourget, but engines are still being sent back to the Gnome Rhone factory (Paris) for overhaul. Thought that the shop work had been improved considerably since I was there in 1936. A number of interesting gadgets are in use, among them a new type of heating boiler that may interest some of our people. The practice generally seemed quite up to present standards. A new instrument shop is being installed.

While at LeBourget, took time to look over the new passenger station which was only under construction two years ago. Although not on the grand scale of the new Templehof, it is, nevertheless, more impressive, both for size and general arrangement, than anything that we have in the U. S. at the moment. The Commandant took me through the various departments, and up into the control tower. The system of traffic control seems not quite as rigid as ours at Newark, but follows somewhat the same pattern, and seems to work satisfactorily for the amount of traffic handled. Winter weather conditions in northern Europe are probably worse on the average (more rain and fog) than ours in the States, so the boys here have plenty of opportunity to navigate and to fly blind (they do it on a ground D.F. system, supplemented now by radio compass on the ships) and to practice blind landings by the Z-Z (Zed-Zed) and Lorenz systems, both of which are available at LeBourget.

Since I had seen both the Renault (air-cooled, in line) and Hispano-Suiza (liquid-cooled, vee) engine plants in 1936, I selected Gnome-Rhone this time as typical of high production on radials. Mr. Brégou of Air France made the arrangements and kindly furnished the transportation and M. Saintprive and M. Le-Bedeff conducted us through the factory. The plant is arranged on a multi-floor plan somewhat like Wright Aeronautical at Paterson. At present G-R is almost entirely on 14-cylinder engines, turning out about 150-160 per month with about 5000 people employed, working 3 eight-hour shifts. This apparent disparity between personel and production (against U. S. standards) is offset by the fact that practically every item in the engine (except carburetors, magnetos and spark plugs) must be manufactured by G-R. That includes valves, valve springs, pumps, exhaust collectors, engine mounts (steel tube) and cowling —things that we ordinarily buy from parts suppliers or ask the airplane manufacturer to build. It seemed to me, however, that they spend unnecessary time and money carving intricate crank cases out of practically straight forged dural cylinders.

Gnome-Rhone test beds are in a series of dungeons, about two levels below building grade. The engine mounts are beneath the floor of the control gallery. Instead of peering horizontally through soundproof glass windows to watch the engines as is usual practice, you pull up a steel manhole cover in the floor and there is the engine blasting merrily away beneath your feet, accompanied, I may add, by a terrific din, whether or not the covers are in place.

Gnome-Rhone also manufactures a mechanical, controllable pitch propeller, for which a new plant has just been built, and is now being equipped, alongside the engine factory. Here, as in every other propeller plant I saw in Europe, a number of Henry Berliner's profiling machines are much in evidence.

But of all visits I made in France, the afternoon spent at the Arsenal de Villacoublay with M. Vernisse, its chief, was far and away the most interesting. Unfortunately, it is one of the things I can write least about, for I was shown a number of projects there that are still in confidential status. I was told that I was the first foreigner to be shown some of them.

Villacoublay Arsenal was established some years ago by the Air Ministry as a development station for prototypes. It embodies not only design facilities with a large staff of technicians and engineers, but also complete modern machinery for aircraft construction in all sorts of materials. Generally, the Ministry writes a specification for a new type, turns it over to the Arsenal for design and production study, and for the construction of a prototype. The machine is test flown. Changes are made when necessary both for performance and production improvement, then orders in quantity may be placed with whatever unit of the nationalized industry may best be able to turn it out "en grand serie." Or, if any designer or manufacturer has a particularly "hot" idea for a new machine, Villacoublay may undertake to build and test a prototype at government expense. There are examples of both methods under way at the Arsenal now, one of them by M. Wibault, with whom I talked while there.

No basic research is done at the Arsenal. The big laboratories (comparable to the N.A.C.A.'s Langley Field) are at Chalais-Meudon. Villacoublay deals much more with practical application and with production. The general layout and condition of its shop and office equipment is by far the best I have seen in France, and quite up to anything of its kind.

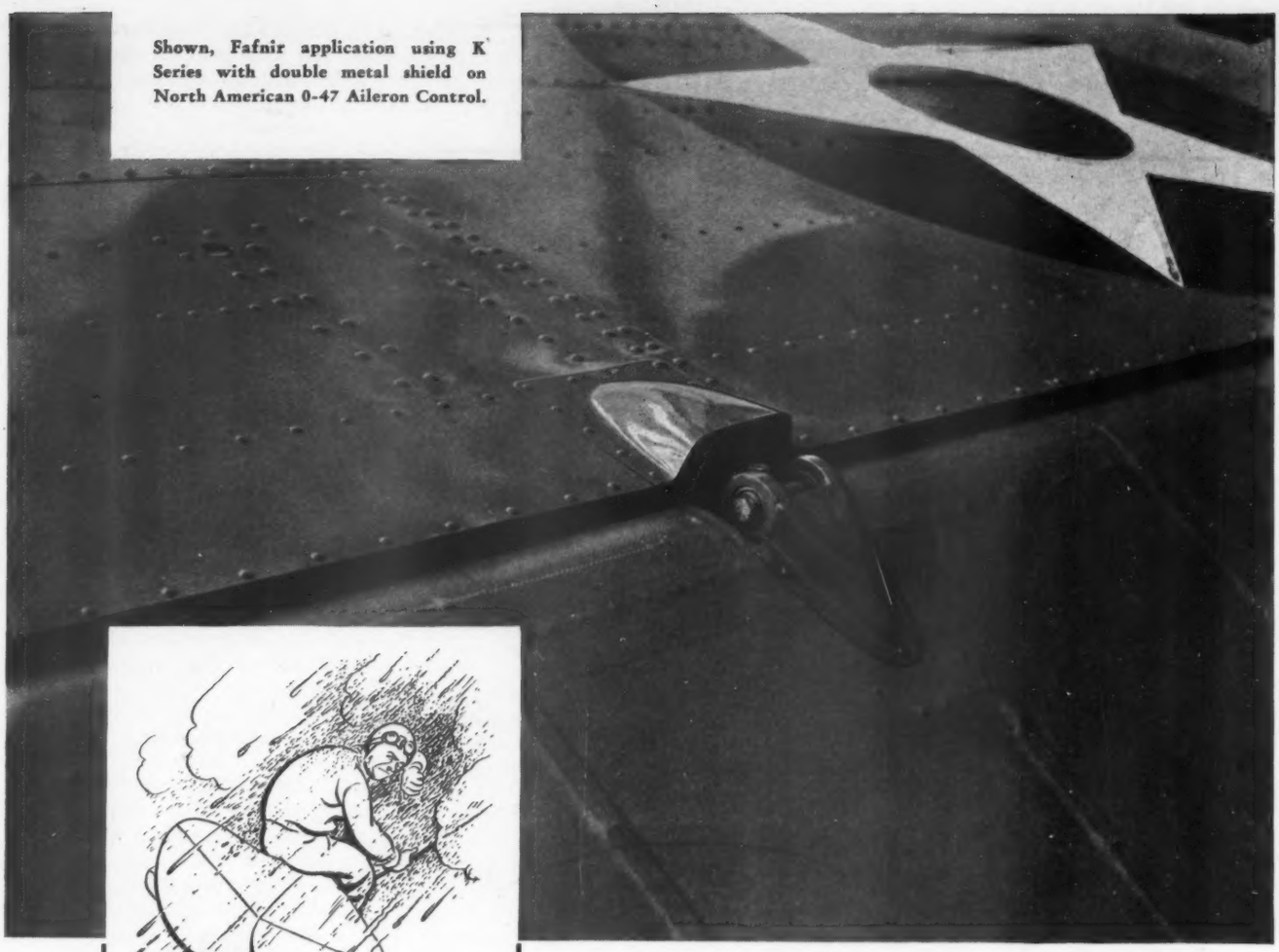
Saturday evening (November 26) I took the Rome Express for Italy. Had intended to fly down via Air France to Marseilles and with Alla Littoria to Rome, but the weather was very bad, and, besides there were no services on Sundays, so I took a train which put me into Rome at 4:30 on Sunday ready for business the first thing Monday morning.

Thanks to Commander Cassidy, Assistant U. S. Navy attaché for Air, everything was in excellent order. Permissions had been obtained and a schedule set up for the week,—with the Embassy and the Air Ministry on Monday; Guidonia on Tuesday; Caproni and Breda at Milan on Wednesday; Savoia Marchetti at Sesto Calende on Thursday; and Fiat and Aeronautiche d'Italia at Turin for Friday.

Again, I couldn't say too much about the excellent cooperation given by the Italian Air Ministry and the officers detailed to act as guides. Major Vezzoli was most generous of his time in handling my arrangements for Rome, and I am particularly grateful for the assistance rendered by Capt. Renato Benadusi at Guidonia, by Lieut. Mario Gilli in Milan and Sesto Calende, and by Capt. Pericle Chieri in Turin.

Guidonia was quite up to expectations. I had heard so many enthusiastic accounts of it from Lester Gardner (who visited it in 1936) and others that I was quite prepared for some-

(Turn to page 76)



Shown, Fafnir application using K Series with double metal shield on North American 0-47 Aileron Control.

DO YOU THINK there's no such thing as "Slipstream Scale"? We dare you to grab-a-holt and take a ride on the tail of our "Stallable Special"—a modern ship in every respect. Here we go—the motor catches and the pilot's revving her for the warm-up. Don't mind that dust and dirt from the prop wash — it's one of the symptoms. Phooie! A burst of oily smoke. Well, it's all part of the game. We're off! Smack! Oh, that was just an echelon of June Bugs at low altitude. Wait'll we go under that rain cloud. Yeah, it is wet isn't it. What's this — icing? Well, we'll set'er down now. You say you're feeling a little scaly? That's what your tail group bearings are up against every minute the motor's turning!

"SLIPSTREAM SCALE"

Is A Dangerous Disease . . .

But These Fafnirs Are Born Immune!

Born immune to dust, dirt, exhaust carbon "bug juice," rain and snow — all of the symptoms that go to make up "Slipstream Scale" — these Fafnirs have a place in every exposed part of your control mechanisms. Sealed — by engineers who know that the best kind of seal that can be designed is none too good. Sealed to retain their lubricant through countless hours of heat and cold and constant movement.

They're typical of the many specialized aircraft bearings designed to meet definite needs that designers know about — and operators encounter in everyday flying. They're the kind of bearings that make flying easier and safer, and cut ship maintenance to the bone. Write for the aircraft catalog. The Fafnir Bearing Company, New Britain, Conn.

The Aircraft Bearing Specialists

FAFNIR BALL BEARINGS

THE BALANCED LINE . MOST COMPLETE IN AMERICA

Editor's Travel Letter

(*Continued from page 74*)

thing unusual, and I was not disappointed. Major Giuseppe Vezzoli drove out with me in an Air Ministry car and returned later in the day to pick me up. No need here to go to any lengthy description of the high speed towing basin, the battery of four parallel wind tunnels, or the spinning tunnel, for they have been described and are already familiar to you. I was much interested, however, in the newest piece of research equipment, the high speed, low-pressure tunnel for stratoaerodynamic research. Dott. Ing. Prof. Antonio Eula, head of the aerodynamics section went over it with me with justifiable pride. Speeds up to 2.7 times the velocity of sound can be attained in the test chamber at pressures corresponding to sub-stratosphere levels. The tunnel is a closed throat single return type with circulation provided by a 13 stage turbo type compressor. A cooling chamber between the compressor and the test section takes out the heat of compression and is used to control temperatures. Under operating conditions, shock waves and other flow phenomena are photographically visible (by the use of polarized light) without any necessity of introducing smoke in the air stream.

I left Rome by sleeper Tuesday night (the weather being very bad) after spending a pleasant evening with Major Jack Hodgson, Assistant Military Attaché for Air at Rome, and reached Milan Wednesday morning. There I was met on schedule by Lieut. Gilli, and our first visit was at the big Caproni factory on the edge of the city. Was received very cordially by Ing. Gianni Caproni himself. He asked me particularly to extend his greetings to all his friends in the United States.

The plant at Milan is in production on two types of fast bomber, the Ca135 (heavy) and the Ca310 (medium). There were only a few of the former in sight, but the production line was going full out on the 310. This machine is a low wing, 2 engined monoplane (of about 1200 hp. total) of (very) mixed construction. The nose section to aft of the cockpit is mainly of steel tube, dural covered. The rest of the fuselage is of steel tube, fabric covered. The wings and tail surfaces are of wood. This illustrates a very logical use of materials for Italy, where supplies of all kinds are not unlimited, and where designers are making the best use of available materials and labor for aircraft construction.

Caproni has a very excellent "chain" type assembly plant, where machines flow through from stage to stage in the best Detroit manner. Here again was visible the principle laid down by Ted Wright in his London lecture, the maximum break-down of operations with few operators working at each stage to avoid inefficiency through mutual interference.

From Caproni we moved on to Breda, also in Milan, and encountered a different type of construction, an interesting combination of steel tube and dural in the Ba88, a very high powered, high speed twin engined fighter and dive bomber for a crew of two or three. The complete machine is as slick a bit of flying equipment as you ever saw, and is every bit as fast as it looks. It holds a world's record of 524.2 k.p.h. with a load of 1000 kg. Engines are Piaggio, 14 cylinder, of 1000 hp. each.

Breda's managing director, Dott. Ing. Cav. Angelo Vallerini, conducted us personally through the plant. As with all Italian plants visited, it was efficiently laid out, well equipped, and obviously well managed. The operation on wings, tail surfaces, fuselages, etc. are broken down and located in various separate shops or departments, —all feeding the final assembly bays. Outstanding, was a beautiful test laboratory fitted up for static and vibration tests on complete machines and on sub-assemblies. A new two-meter open throat wind tunnel is now being added to the lab as an aid to Breda designers.

Early the following morning (December 1) Lieut. Gilli and I drove out to Milan's new Forlanini airport. Col. Tempesti, who was one of Balbo's officers on the trans-Atlantic flight in the summer of 1935, is in charge. He greeted us cordially and extended every facility for seeing the field and its equipment. It is thoroughly modern, and is fitted up with everything in the way of radio control, blind landing beam (Lorenz), weather service, etc.

From Forlanini we dashed back to Milan to catch a train for Sesto Calende where the main plant of Savoia Marchetti is located. Started over 20 years ago as a seaplane factory, the original buildings were on the shore at the southern end of Lake Maggiore, near the town. The shops are now only the wing-building department, with the main plant on the railway in Sesto Calende proper, and with a new assembly plant (still under construction, but already in use) on an aerodrome at Vergiate.

Two basic types (each with several modifications) are in production at Savoia, the military 79 and the commercial 83. Both are 3-engined monoplanes of mixed construction, with wooden wings and fabric covered, welded steel tube fuselages and tail surfaces. Incidentally, an extraordinary amount of welding of steel tube and formed steel sheet goes on at Savoia Marchetti. The welding department is one of the largest and most highly organized I have ever seen. Four types of welding are employed (a) oxy-acetylene; (b) electric arc, (c) atomic (hydrogen) arc; and (d) electric spot. All assemblies are studied for the best method, depending on thickness of parts to be joined, alloys used, etc. I saw some intricate sub-assemblies that made use of all four methods. In the welding department I met Ing. Agostino Nepoti who had just won second prize in the Lincoln Foundation contest for papers on welding methods.

As with most large aircraft factories in Europe, Savoia-Marchetti has its own apprentice training school where boys of 14-18 can learn the trade. Since the factory has been so long in Sesto Calende, there are now many second generation aircraft workers employed in the plant, or at work in the apprentice school.

At the assembly plant at Vergiate. I was permitted to go aboard not only the commercial machines being fitted up for Ario Linee Italiane's projected South Atlantic passenger service, but also on a completed model 79 bomber, which was most interesting.

On the sides of the commercial machines in production I noticed that the ALI insignia was combined with a pennant-like device containing the pictures of three very cheerful-looking green mice, complete with tails and whiskers. My hosts explained that when anyone in Italy wants to ponit out something extraordinary he will say "Ti fero verdere i sorci verde," which, being translated, means "I'll show you a green mouse." So when three S-M S.79s started out on the record-breaking Paris-Damascus-Istres flight last year, the crews choose

(*Turn to page 79*)

Private Flyers

Here's the ideal 2-way Radio for you!

25A RECEIVER—*at left*

New, compact, light—designed for instrument panel mounting. Highly selective superhet receiver covering beacon and weather bands, International Distress frequency, greater part of broadcast band, and the air transport communication band, with crystal stability optional. Weight complete only 16 pounds.

25A TRANSMITTER—*at right*

Designed especially for private flyers, the Multifrequency Midget fits snugly in your instrument panel. Simple to operate, it transmits on any desired private flyers' or airline frequencies. Quartz crystal oscillators assure accurate transmission. Built-in relay permits use of single antenna for both transmitting and receiving. Weighs 25 pounds complete.

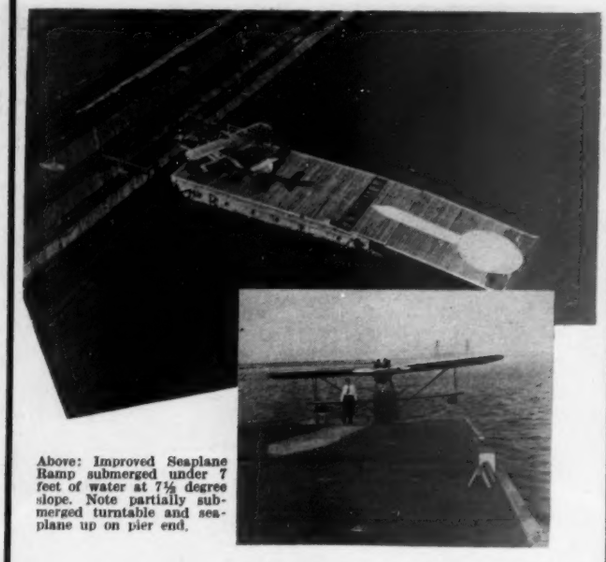
UNDER today's stricter regulations governing use of airlanes and airports, 2-way radio is becoming as necessary to private flyers as it has always been to the airlines.

In selecting *your* equipment, why not trust to the radio judgment of the nation's major airlines? All of them have used Western Electric for years—have proved its dependability through millions of hours under all conditions.

The 25A Receiver and 25A Transmitter—specially designed and priced to meet *your* needs—are as high in quality, as thoroughly reliable as the larger airline units. For full details: Western Electric Co., Dept. 324 A, 195 Broadway, New York.

Western Electric *Northern Electric in Canada*

TWO-WAY AVIATION RADIO TELEPHONE AND TELEGRAPH EQUIPMENT



Above: Improved Seaplane Ramp submerged under 7 feet of water at 7½ degree slope. Note partially submerged turntable and seaplane up on pier end.

Picture above shows Marianno Seaplane Ramp 30 seconds after electric operating mechanism has lowered ramp 7 feet below waterline (at either high or low tide), seaplane is on turntable, after being lifted from the water level.

NEW . . in principle

. . in performance improvement

. . in economy!

MARIANNO LIFT RAMP

THIS electrically operated ramp provides quicker, safer, more economical seaplane operation, insures savings in first cost, in operation and maintenance as compared with all other present-day ramps. It can be assembled (dismantled and reassembled) and operated from piers, boats, floats or barges on any body of water.

Complete Safety and Comfort for Passengers

Aviation authorities — governmental, commercial and private—who know seaplane ramps, both technically and practically, say it is "the finest ramp, and the cheapest to own and operate, we have ever seen." Unaffected by ice or other climatic conditions, fully mechanical, the Marianno Seaplane Ramp operates at half the cost of any other now manufactured. Its first cost is much less than comparable stationary ramps for seaplanes, flying boats or amphibians, and can be designed for any capacity plane up to 100 tons.

For larger seaplanes or flying boats, the Improved Seaplane Ramp provides a flush type dolly deck in which the bed carriage and dolly are submerged when ramp is mechanically lowered to receive an incoming plane. Then ramp is raised by one person (a child can do it), pushing the controlling button, a 30-second operation.

Write for engineering details or demonstration

MARIANNO SEAPLANE RAMP CO.

PORT NEWARK **NEW JERSEY**

Demonstration Ramp at Port Newark, N. J.

Phone: MArket 2-0937

Hs 126

HENSCHEL FLUGZEUG-WERKE A.-G.

BERLIN-SCHÖNEFELD · TELEGRAMME: HENSCHELFLUG BERLIN

Editor's Travel Letter

(*Continued from page 76*)

green mice as their mascot. In the future, then, all passengers crossing the South Atlantic in Italian machines will do so under the sign of the Green Mice.

Ran across the trail of an old friend at Vergiate. Was told that Don Wilson had landed there somewhat unexpectedly in a fog a week or so ago. He had been cruising about Europe in a Ranger-Fairchild and was then on his way up from Rome to Paris when the weather closed in on him.

Returned to Milan in the late afternoon and took one of the new diesel-powered, high speed ("Rapido") trains for Turin. It had plenty of speed but was not as comfortable as it might have been, as it was noisy and quite rough.

Early the following morning (December 2) Capt. Chieri called for me at my hotel. He had been out in China for three years and had also spent considerable time in the States. We found we had many friends in common.

A Fiat car picked us up at 8:30 and took us out to the main offices of the great combination automobile and aircraft engine works. General Savoia, who heads up all Fiat's aviation interests, received us, with a group of his engineering staff, including Dott. Ing. F. Gabrielli (one of Fiat's outstanding airplane designers), Dott. Ing. C. F. Bona (Director of the aviation engine department) and Dott. Ing. Cav. Paolo Ragazzi (assistant to Dr. Bona). An extensive tour of the airplane engine plant, the automobile factory, and the aircraft plant (Aeronautiche d'Italia) had been arranged for the day.

The motor factory is mostly on 14 cylinder radials with a few of the older Vee liquid cooled engines still going through for service replacement and for the few remaining biplane fighters in production. Controllable propellers are also in production under Hamilton-Standard license. The first Hydromatic had just been received for production study. The plant is on the multiple floor plan. It is beautifully laid out, equipped to the nth degree, and most efficiently managed. Every department was spotlessly clean and in "battleship" order. Should rate it as one of the finest engine plants in Europe. The final test departments with an elaborate high altitude test laboratory were especially striking.

Ing. Gabrielli met us at the airplane factory and we were first received by its Director, Dr. Lucio Nardi. Accompanied by Gabrielli and Dr. Roberto Schieroni, we went through the several manufacturing departments. Two types were in evidence, the biplane fighter, which is still in active service, on limited production (mostly for use in Spain, at a long guess) and the twin-engined bomber, both for active Italian air force use, and for export. They are built to the designs of Ing. Rosatelli. Both machines are of mixed construction. Fuselages are of welded steel tube, with wings and tail surfaces framed in dural tube and extrusions, the whole fabric covered. (At another factory at Marina di Pisa another series of Fiat machines, all metal, to Gabrielli's designs, are in production. I didn't have time, however, to visit that particular unit, although I was invited to do so.)

The Fiat factory buildings are for the most part, quite new. They are very spacious, and beautifully laid out. With walls and roofs largely of glass, and with interiors white painted, the lighting is remarkably good. Here, as everywhere in Italy, hundreds of American built machine tools are installed. Under the "Autaurchia" program, however, Italian manufacturers of machine tools will soon be in a position to actively dispute the entire field.

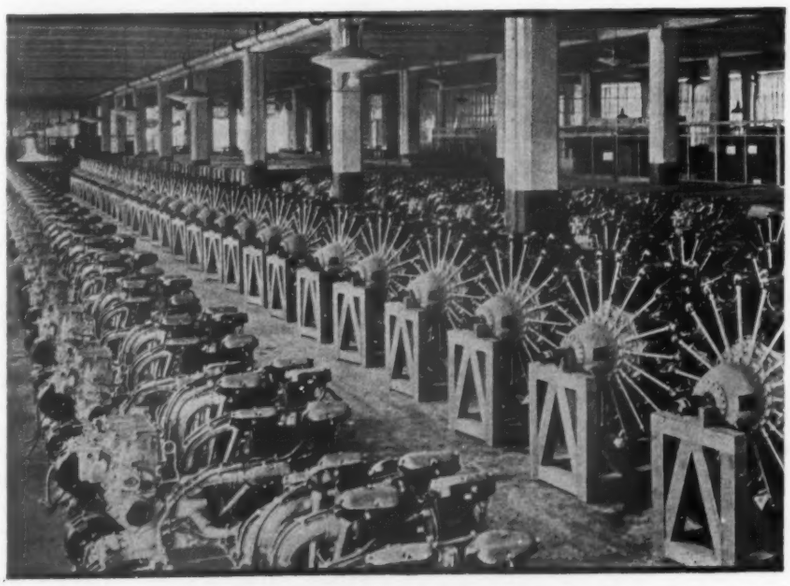
Incidentally, "Autaurchia" is the key word in Italy today. It means national industrial and economic self-sufficiency. Elaborate exhibitions are being held at industrial centers all over Italy to show what has been accomplished in that direction. I visited one in Rome, chiefly on metals and minerals, but which led up to a great display of modern weapons by the Army, Navy and Air Force. The real climax of the whole show was a line-up of the actual bomb load of one Gruppo de Bombardment (two squadrons, or 18 machines) totalling 30 tons. Divided up into 800 kg., 500 kg., and 200 kg. units, the bombs, mounted vertically in racks, stretched clear across the end of a large hall. It was certainly impressive. It gave me a slightly nauseated feeling. I saw a young priest, complete with flowing robes and all the rest of it, examining them with great interest, and I wondered what he thought about it!

Long as it has been, this letter has hit only a few of the high spots of my travels since leaving England. After I get back to the States I shall be able to fill in many of the details for you, or for anyone else in the industry who may be interested.

My best to the staff and with season's greetings to all our friends in America.

Regards,

S. P. J.



A line-up of production engines at Fiat's efficient Turin plant.

Air Power Box Score

(*Continued from page 25*)

Austin "shadow" plant where Bristol engines were being produced and the Bristol "shadow" factory where engines are being assembled from parts manufactured in five or six automobile factories. Also, I went to Derby to see Rolls-Royce production. Over 5,000 Rolls-Royce engines are said to be on order. Guessing again, it seems likely that between the parent and the "shadow" factories, Bristol engines are coming out at a rate of about 120 a week; Rolls-Royce engines at approximately 40 a week, with the rest of the engine industry producing about 20 a week, or over 8,000 a year total.

In France the situation is far from good. France at the moment is a country of many prototypes but little actual production. Under the program of nationalization of aircraft factories begun in 1936, and in the face of the difficult labor situation in the country generally in the past year, production has gone steadily downward.

In the course of my two visits to France I have seen a number of representative aircraft and engine factories. To anyone accustomed to modern American plant planning, and especially to anyone who has seen the truly remarkable plant work in Germany, French factories are decidedly disappointing. Working conditions are not up to standards which we consider essential. Machines are crowded into small spaces, are badly arranged from a production flow point of view. Average plant lighting, heating, and sanitation is certainly sub-normal.

I must say, however, that my own impression of the general state of French shops was considerably improved after I visited the Arsenal at Villacoublay. The plant there has been laid out and equipped to the very best modern standards. Everything is clean and in good order and the foreign visitor feels completely at home in the surroundings there. I confess that I felt better about the whole French technical outlook after spending the best part of a day with M. Vernisse and his staff at Villacoublay. I was told also that conditions in some of the modern producing plants in the outlying districts are very good, and compare favorably with the set-up at Villacoublay.

A really brilliant analysis of the French productive position with respect to the German by Henri Bouché, Editor of *L'Aeronautique*, was published in the November 19, 1938 issue of the French journal *L'Illustration*. He traces not only the rise of Germany's air power since 1934 but also brings out by a series of maps the progressively strengthening strategic position of Germany in Central Europe due to political realignments. He also draws a detailed comparison of the production and productive capacity of the two countries and the growth of their air forces since 1934. Although I believe that M. Bouché has underestimated in some respects the accomplishments of the Third Reich during the last five years, at that, the picture he paints for the current French outlook is, by contrast, very dark indeed. He believes, however, that nationalization of the aircraft industry in itself has not been responsible for the debacle. The real difficulty has been economic. For one reason or another, the government has failed to provide the industry with the funds necessary to keep pace with the rest of the world. From 1934 to 1938 the French Air Ministry budget has been raised from about two billion francs to slightly over eight billion francs (paper). Over the same period, however, the purchasing power of the franc has been cut practically in half. Instead, therefore, of the air appropriations being quadrupled, actually they have been little more than doubled over the five year period. At the same time, British Air Ministry appropriations have risen from 20 million pounds sterling to over 120 million pounds in terms of actual purchasing power. In other words, British funds have been multiplied by six where French appropriations have been barely doubled.

In Italy, the production picture at the moment looks better than in France or England and compares favorably with the German, although not on such a grand scale. Production both of planes and of engines seems to have settled down to a steady pace well up with the requirements of the military services.

Italy is the only one of the major European powers that has been on an actual war-time footing recently and she has completely modernized her air force and her producing plants since 1936. Actual output at the present time is probably in the neighborhood of 200 units per month, which is well below the available productive capacity.

I think that there has been a somewhat irrational tendency to underrate the Italian effort because of the prevalence of the so-called "mixed" construction in her aircraft. American aeronautical observers in particular are prone to rate anything as "old-fashioned" (and therefore inefficient), if it is not of all-metal monocoque construction. Because Italy's supplies of light metals and light metal workers have been limited, her designers have been forced to make the most efficient use of materials at hand with the type of labor most readily obtainable. One sees, therefore, current production in Italian factories of machines with all-wood wings, welded steel tube fuselages, combined with stressed skin dural elements. A case in point is the Caproni Model 130 twin-engine bomber, which is now rolling through Caproni's Milan plant at a very creditable rate. Its designers have made a detailed study of the machine and have applied available materials to certain parts in the most efficient way, a method typical of a number of designs that I saw in Italy. Parallel studies are also being made of all-metal, monocoque types. For example, one division of the huge Fiat airplane division under the direction of engineer A. Gabrielli at Marina di Pisa, is devoted exclusively to the production of all metal pursuit ships and larger bombing and transport types.

Although I saw only one aircraft engine plant in Italy, the Fiat plant at Turin, it certainly measured up to modern manufacturing standards in any country in the world. No accurate figures were available as to its production, or its personnel, but I would guess that it is certainly doing as much as Gnome-Rhone in France, with possible two-thirds the number of men employed. Its testing and research work seemed to be of a very high order and the high altitude research laboratory is the equal of anything of its kind in the world.

So much for plants and production. There is an equally long and equally interesting story that might be told covering the personnel problem in the several countries. There is a form of wishful thinking commonly current that will admit that Germany and Italy have done great things in the production of materiel, but have fallen down badly on the training of per-

(*Turn to page 83*)

Greater Safety . . . Faster Opening
No Blanketing . . . No Fouling . . .
No Snaking . Greater Wearing Comfort

SWITLIK
SAFETY CHUTES

●Since 1930, we have furnished 57% of all the parachutes purchased by the U. S. Air Forces. All these parachutes were constructed in accordance with Army Air Corps, Navy Department or our own specifications.

The exclusive safety and comfort features of Switlik Chutes, their absolute infallibility, their compactness, lighter weight, and quality of materials and workmanship rightly establish them as the foremost safety chute. Every type available for all commercial and military purposes. Switlik Chair Chutes for cabin planes now installed by the plane builder before delivery to you. Send TODAY for your copy of bulletins and catalogs.

●

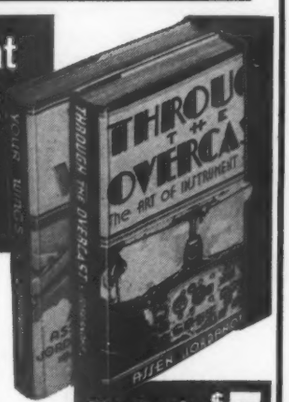
Manufactured under Approved Type Certificates awarded by The Civil Aeronautics Authority

●

West Coast Dealer, Finney's Parachute Service, Alhambra Airport, Alhambra, California.

SWITLIK PARACHUTE & EQUIPMENT CO.
S. BROAD & DYE STS. . . . . TRENTON, N. J.

Examine these great AVIATION BOOKS for 10 days, *at our risk!*



ALAVISHLY illustrated, complete aviation library at an amazingly low cost. . . . These are the books the airmen use to make themselves better, *safer* fliers. . . . "The standard books on flying the world over," by ASSEN JORDANOFF, pilot, instructor, engineer, technician and technical adviser to leading American airlines and manufacturers since 1921.

The 2 vols. Boxed, only **$5**

THROUGH THE OVERCAST
WEATHER, INSTRUMENT FLYING, ETC.

The book that takes the subject of meteorology out of the realms of higher mathematics and makes it simple enough for the average person to understand. Gives complete, illustrated descriptions of all the new instruments —plus how to use them—now being installed to make flying easier and safer. 356 pages, with *over 300 illustrations.* Price (if purchased separately), $3.00.

YOUR WINGS
THE MANUAL OF FLIGHT

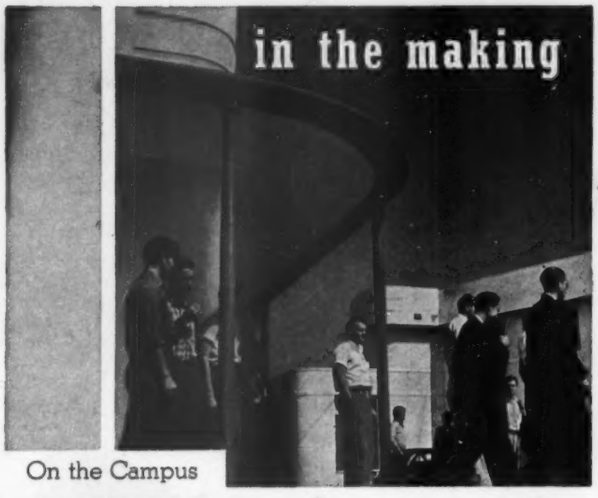
Now being used by tens of thousands of aviators the world over. Standard text in leading American aviation schools. Treats everything in flying from basic principles through advanced aerobatics. 281 pages, *425 illustrations.* Price (if purchased separately), $2.50.

SAVE MONEY!
Order Both Books Now

Through the Overcast and *Your Wings* may be seen and purchased separately at any bookstore, Air Associates, Inc., or by mail from the publishers. When writing the latter, SEND NO MONEY unless you want to. Pay postman on delivery; only $5.00 for both books, plus the few cents delivery charge. Books may be returned within 10 days for full refund if you are not completely satisfied. Address:

FUNK & WAGNALLS COMPANY
Dept. 1898, 354 4th Ave.
New York, N. Y.

AIRCRAFT CAREERS



On the Campus

PICTURE *Yourself* HERE AT AERO I.T.I.

In Class

In the Shops

Starting YOUR CAREER

. . . in a great industry that needs thousands of trained men RIGHT NOW . . . that offers you an unlimited future in the fascinating work of creating and building tomorrow's bigger, better planes. Picture yourself at Aero I. T. I. starting such an ideal career . . . following a *Master Aircraft Mechanics* or *Aeronautical Engineering* course. Find out why there is such a big demand for Aero I. T. I.-trained men . . . why they advance so much faster. Get the whole story in a free new booklet. Send the coupon NOW.

EXECUTIVE BOARD

C. A. VAN DUSEN	JOHN K. NORTHROP	ROBERT E. GROSS
Vice-Pres. Consolidated Aircraft Corporation	formerly Pres., The Northrop Corp. and Vice-Pres. Douglas Aircraft Company, Inc.	President Lockheed Aircraft Corporation

Aero Industries Technical Institute
5261 West San Fernando Rd., Los Angeles, Calif.
America's Finest Aircraft Training Institution

Please send free booklet and complete information on Aero I.T.I. training for aircraft careers. (This information intended only for men over 17 and under 40.)

NAME_____ AGE____

ADDRESS_____

CITY_____ STATE_____ a-14-a

Going Places In 1939? . . . Then Let This FREE BOOK Help You

Newcomer or old timer—you will find practical, tested ideas in the pages of this book, specially compiled by the editors of AVIATION to meet the needs of Students, Pilots, Mechanics, Plane Owners, Fixed Base Operators, Transport and Airport Men. It is yours, without cost, with your subscription to AVIATION—the monthly issues of which bring you equally practical ideas for making your way in your chosen work.

While we call the book "Money Making Ideas" it's not a mere collection of ways in which to earn cash. It is filled with fresh, inspiring ideas that are self starters for live wire men. It's the kind of a book that encourages you to head for the top—by showing you how other men (many with such handicaps as no money, small town locations, etc.) have forged ahead and realized their aviation ambitions.

If you're just starting out—if you're experienced but feel you're in a groove—if you're impatient to get ahead *faster*—this book and the monthly issues of AVIATION can help you with these aims. Thousands of our readers who started with us as students are now important men in the world of flying. They claim that the all round coverage and information brought them by AVIATION has helped them to advance. This same material can help you. And the cream of much of it is contained in the pages of "Money Making Ideas" which comes to you free.

All books are sent out by express to insure safe delivery. There is a small charge of 15c—payable to the expressman upon delivery of the book.

Attention: Present Subscribers

You may obtain a copy of this FREE book by renewing your present subscription. *Regardless of when your present subscription expires,* you must send in another PRE-PAID renewal order. Your subscription will be extended for additional time without duplication. Mail in your order and payment today.

Forward March In Your Flying Career — with AVIATION and this 128 page, practical book

MAIL THIS COUPON AT ONCE

Aviation, 330 W. 42nd St., New York, N. Y.

I enclose $4. Enter my subscription to Aviation for two years and send me "Money Making Ideas in Aviation" free. I'll pay expressman 15c delivery charges.

( ) If renewal order, please check here.

( ) For 1 year subscription enclose $3 and check here.

Name .....

Address .....

City ..... *State* .....

Company .....

Position 1-39

This Offer Good Only in United States, Possessions and Canada.

Dollars from Photography—How to Buy a Plane on $20 a week income—Finding Jobs for Students—Ideas for Charter Service—Fixed Base Problems and Income—Instrument Training from Scratch—Flying Under the Hood—How An Airplane Opens the Door for the Salesman—The Low-Priced Airplane—Maintenance Kinks and Short Cuts—Trends in Sightseeing, Photography, Dusting—Aircraft at Work, as Told by users of Business Planes—and many other articles for everyone interested in the flying industry.

To get your *free* copy of "Money Making Ideas in Aviation" simply use the handy form below. Every paid-in-advance new or renewal subscriber may have a copy of this helpful book, without cost. Send only the regular subscription fee—$3, one year, $4 two years—and your book will come to you at once. There may be just the ideas you need in the pages of this book. Let it, and the monthly issue of AVIATION help you go places in flying. Get your copy at once by filling out the convenient form below and mailing it to us NOW.

Box Score

(*Continued from page 80*)

sonnel to fly and to service the machines that they produce. Even if I had not seen something of the great training and apprentice programs in Germany and Italy, I would still be inclined to question that view. It simply does not make sense to assume that Germany, for example, with her inherent capacity for detailed planning, would overlook such an important element in her air strength. Again, although figures are not available, there is little reason to believe that Germany (or Italy) has not kept pace with her airplane producing program in the matter of training pilots and mechanics. Under the NSFK in Germany, and under the RUNA in Italy, thousands of youngsters are being trained with models, on gliders, and on powered planes for ultimate entry into the air forces. A great reserve of pilot material is always on tap. Also every factory has large and elaborate apprentice schools in which thousands of young workers are being trained for aircraft and engine production, and for maintenance. Somewhat similar programs are being started in other countries. The Civil Air Guard is a British scheme to train flying and non-flying personnel, but it is only now getting under way and is certainly far behind the lead of Germany and Italy in that direction. British and French apprentice courses in factories are on a much smaller scale and seem to be much less efficiently organized than are similar plans in the two dictator countries.

As for morale, that is an intangible factor that is not subject to accurate evaluation. In estimating morale factors for the score sheet, however, I have tried to weigh in everything that I know about conditions, not only in the organized air forces, but also in the aeronautical industries and in the several countries generally. Economic factors have also been taken into account.

As for our own position at the moment, and as for our program for the immediate future, I have long since felt that we are well below minimum strength for national safety at present. The most important thing that could be done at the present time would be to re-examine our defense problem rationally in the light of present world conditions, and to determine realistically the size and character of the air forces that we need. We should then build to that level and then maintain that level at highest possible efficiency.

I hope, however, in setting up any new programs that the people in Washington will not make too much of a fetish of mere numbers of aircraft, nor will be stampeded into hasty and ill advised plans to attain certain numbers. They should remember that mere numbers are not a measure of air strength. We must be sure that we build an air force that is properly balanced as to types and properly adapted to our own particular and peculiar problem of defense.

Actually, we are in no immediate danger of attack, as are many of the nations in Europe. Fortunately, we now have time enough to examine our problem critically, and to solve it logically without putting ourselves unnecessarily under a war-time pressure with its inevitable inefficiency and waste. We should draw what lessons we can from European experience of the past few years where hastily concocted "shadow schemes" and nationalization of industries have not yielded expected results, but where (as in Germany and Italy) careful long-range planning and rational production control have resulted in building the most efficient air forces in the world. We must, however, work under a different plan, for dictatorship is not in the American scheme of things.

We have a relatively small, but highly efficient basic aircraft and engine manufacturing industry with plenty of capacity to expand to take care of the needs of the services on any reasonable building program. Most important at this time is for everyone concerned to keep his head so that we will not plunge into ill considered projects that we will regret later. We have a long way to go, but we should be prepared to move forward only as rapidly as is consistent with the establishment of an air force, both on land and sea, adapted to our particular requirements, backed up by an efficient industry flexible enough to take care of current requirements, and at the same time capable of tremendous expansion in time of national emergency.

A Boeing YB-17 bomber in its war paint

Paris Show

(*Continued from page 27*)

a twin tandem engined fighter with an unusual combination of elements (including tricycle landing gear)—the one refreshingly new note in the whole show. How practical his idea is from a tactical standpoint remains to be seen.

The Poles put up one of the best shows on the floor, one indicative of considerable design progress over their exhibits of 1936. The PZL had five machines on view, all of them thoroughly modern in concept and construction. Most striking, perhaps, was the heavy bomber, LOS, a twin-engined, mid-wing, all-metal, machine with excellent lines. It is designed for Bristol Pegasus or Gnome-Rhone or any other radial engine up to 1,200 hp. Two other similar twin-engined types were shown, the three-place fighter Wilk (two PZL inverted air-cooled eight-cylinder Vee engines of about 300 hp. each), and a very slick little twin-engined (four-cylinder Gypsies) two-place trainer for transition work from single to twin-engine machines. Two single-engined aircraft were also on view, a three-place

low-wing monoplane with fixed undercarriage, the SUM; and a high-wing, reconnaisance machine, the MEWA, for Army cooperation work, similar to the British Westland Lysander.

United States representation at Paris was unusually good this time. Both Curtiss-Wright and United Aircraft had booths of their own on the main floor. Aviation Manufacturing Corporation had its own booth in one of the galleries, featuring Lycoming engines and propellers, and showing also photographs and specifications of Vultee and Stinson. Consolidated, Douglas, and North American had separate exhibits in connection with the Fokker display.

Curtiss-Wright featured a full-scale three-bladed full-feathering electric propeller in operation, and a working cut-away Cyclone. The "exploded" assemblies of the new two-speed supercharger, and the latest accessory drives were well done. A Whirlwind engine was also on the stand.

United had a cleverly worked out longitudinal section of a Twin Wasp on view; also featured the Hamilton Standard propellers and accessories of various types, including the constant r.p.m. governors, and the newest in hydromatic feathering propellers.

Fokker's Douglas exhibit displayed DC-2, DC-3, and DC-4 photographs and models. For Consolidated, a large scale half-model of a PBY was effectively mounted against a plate glass mirror background to give a very good effect of the machine in flight. North American Aviation showed a layout of models and photographs of the NA-16 and other military machines.

Three actual American Airplanes were on the floor, a Chance Vought (United) Navy scout with folding wings; a Taylor Cub exhibited by Cub Aircraft, Ltd. of Copenhagen, Denmark; and the latest Aeronca Chief, shown by Aviation Equipment & Export Corporation. The latter company also featured Edo floats as a part of its exhibit.

A number of American accessory manufacturers were represented by their European agents, among them B-G Spark Plug, Goodrich, Elastic Stop Nut, Stromberg Carburetors, Romec Pump, Plexiglass, and a number of others.

Through the courtesy of the Curtiss-Wright Corporation, AVIATION made its headquarters in the Curtiss-Wright booth. Copies of the November issue had been shipped to Paris in quantity and were available to visitors of importance at the Curtiss-Wright stand.

Seaplanes on Land

(*Continued from page 29*)

up for the next take-off, however, he decided out of curiosity to open the throttle. He had come in so easily it only seemed natural to taxi on up to the line!

To Mike's amazement the Cub immediately responded with a noticeable wiggle, and as he rocked the controls it began to move forward freely along the grass, gaining speed with increasing rapidity as its wings commenced carrying a part of the load. Bumping and sliding along on the keels of its floats it was only a few seconds longer than normal before get away speed had been reached and Mike was off! Really unpremeditated, he was no more surprised than his startled truck driver, as the first recorded seaplane takeoff from dry land was so simply accomplished.

Mike Murphy's testimonial letter, as quoted at some length below, is an interesting document by one who at the moment is undoubtedly the world's most experienced "lander" of seaplanes on land!

"In preparation for and during the Races, I made about 20 take-offs and landings with the pontoons in varying wind and airport conditions with no damage to either pontoons or airplane. This work included a number of landings and take-offs in as much as a 15 m.p.h. cross wind and a number of deliberate landings on one pontoon only, with the ship cocked up so that the wing tip was only a few feet off the ground. Airport conditions varied from hard ground, with very little grass, to a normal well sodded field.

As a result of my experience I would not recommend taking a ship off the ground except in a real emergency because of the strain to which it is subjected as it bumps along gathering speed. On the other hand, I do not hesitate to recommend that any pilot flying a pontoon equipped airplane can make a safe landing with or without motor if he bears in mind that he must land the airplane as he would land on water and favor keeping the nose down and keep plenty of speed. In my landings there was no time in which the airplane ever gave any indication of wanting to nose over, and I think this fear which the average pilot would probably instinctively think of, can be entirely eliminated.

I wish to impress upon you that we have subjected these pontoons to a terrific strain. After giving them a thorough examination, I found no damage or structural failure, and I am sure they would go ahead and do their job on water as they were originally intended."

Mike Murphy's detailed report supplemented by the comments of spectators at his demonstration, and the testimony found in our original letters pretty well sums up the study to date. *Safe landings on land can consistently be made by seaplane under widely varying conditions, without noticeable damage of any sort to equipment.* The record certainly seems perfectly clear about that. Furthermore, it is obviously desirable that the ship should be brought in fast and landed comparatively flat in the keels of its floats.

The theory here, of course, is to transfer the load from wings to pontoons as gradually as possible, and at the same time to put the ship down—on its keels—in the position it must assume as it comes to rest. It seems obvious that this method would be preferable to coming in tail low in a conventional land plane variety of "stall."

There is one other point which a cross country seaplane pilot may wish to remember that seems equally well established, and that is the energy absorbing qualities of his float gear in the event of landing on broken ground or trees, or possibly a serious crash. Factual evidence here is naturally less abundant. The record, however, is certainly clear, while once again theory readily supports it. For it seems only obvious that when floats and struts must go first, there is plenty of kinetic energy to be dissipated before a fuselage and its occupants can come in contact with a first class shock

There are a few further steps which might well be taken in the study of seaplane landings on land, such as, the measurement of the actual forces and the question of which kind of ground is best and why. Possibly the N.A.C.A. or the C.A.A. will complete this part of the picture. It would be interesting indeed to submit the whole subject to a well planned quantitative analysis. But, the qualitative data we already have on hand seems clearly sufficient to base rates on and show us the way.